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**Datasheet for the decision  
of 14 April 2011**

**Case Number:** T 0514/07 - 3.3.07

**Application Number:** 00975724.6

**Publication Number:** 1146955

**IPC:** B01D 65/02

**Language of the proceedings:** EN

**Title of invention:**

Overflow process and immersed membrane filtration system

**Patent Proprietors:**

Zenon Technology Partnership

**Opponents:**

Siemens Water Technologies Holding Corp.

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56, 123

RPBA Art. 13

**Keyword:**

"Inventive step (no) - obvious solution - Main Request"

"Auxiliary Requests filed during the oral proceedings -  
admissible (no) - Auxiliary Requests 1, 3, 5"

"Auxiliary Requests filed during the oral proceedings -  
admissible (yes) - Auxiliary Requests 2 and 4"

"Amendments - allowable (yes) - Auxiliary Requests 2 and 4"

"Inventive step (no) - obvious solution - Auxiliary Requests 2  
and 4"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0514/07 - 3.3.07

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.07  
of 14 April 2011

**Appellants 01:** Siemens Water Technologies Holding Corp.  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
19 January 2007 maintaining European patent No.  
1146955 in amended form.

**Composition of the Board:**

**Chairman:** J. Riolo  
**Members:** G. Santavicca  
M-B. Tardo-Dino

## Summary of Facts and Submissions

- I. Two appeals lie from the interlocutory decision of the Opposition Division maintaining European patent No. 1 146 955 (application No. 00 975 724.6, originating from international application PCT/CA00/01354, published as WO 01/36075 A1), according to which, account being taken of amended Claims 1 to 8 of Auxiliary Request 3 and of a description adapted thereto, both submitted at the oral proceedings held on 15 December 2006, the patent and the invention to which it relates were found to meet the requirements of the EPC. The decision also gave the reasons for refusing the Main Request and Auxiliary Requests 1 and 2, also submitted at the oral proceedings.
- II. The opposition had been filed to seek revocation of the patent in its entirety on the grounds that the claimed subject-matter extended beyond the content of the application as filed (Article 100(c) EPC) and lacked novelty and an inventive step (Article 100(a) EPC), *inter alia* having regard to documents:
- D1: US-A-5 607 593;  
D2: WO-A-98/28066;  
D4: US-A-5 248 424.
- III. According to the decision under appeal:
- (a) All of the requests submitted at the oral proceedings were admissible (Rule 71a EPC 1973).
- (b) The Main Request consisted of Claims 2 to 9 as granted and of an amended Claim 1, in step (b)(iv) of which the term "membranes" was replaced by "modules", to overcome the ground of opposition under Article 100(c) EPC 1973. However, in Claim 9

as granted the omission of the feature "from below the one or more modules", which was essential and indispensable for the functioning of the apparatus, added subject-matter, so that the Main Request was not allowable (Articles 100(c) and 123(2) EPC).

- (c) Claim 9 of Auxiliary Request 1 contained the feature "from below the one or more modules" and was clear (Article 84 EPC 1973) but the subject-matter of Claim 1 was not novel (Article 54 EPC 1973) or obvious (Article 56 EPC) over D2.
- (d) As to Auxiliary Request 2, the subject-matter of Claim 1 was novel and inventive over any of D1 or D2 as the closest prior art. However, the subject-matter of Claim 9, albeit novel, was not inventive having regard to D4 as the closest prior art.
- (e) Auxiliary Request 3 consisted of only Claims 1 to 8 of Auxiliary Request 2, the claimed subject-matter of which was in compliance with the EPC. So was the description adapted thereto.

IV. Claim 1 according to Auxiliary Request 3 read as follows (compared to Claim 1 as granted, additions are indicated in bold, deletions in strike-through):

"1. A process of filtering water, comprising the repetition of a filtration cycle having:

- (a) a permeation step wherein
  - (i) feed water enters a tank; and
  - (ii) a similar volume of permeate is withdrawn from the tank by suction on an inner surface of submerged filtering membranes arranged in modules (10); and
- (b) a deconcentration step wherein
  - (iii) scouring bubbles rise through the modules;

- (iv) the membranes are backwashed with permeate, ~~or a flow of feed water is provided from below the membranes, or both;~~ in such a way that
- (v) water containing solids flows upwards through the modules to exit the tank from a point above the modules."

V. In their statement setting out the grounds of appeal, the appellant patent proprietors *inter alia* reverted to the claims as granted as their main request, to be considered before the main request underlying the decision under appeal. They also appealed the decision against the deletion of the disclosure of the feed flushing method in the description, because Auxiliary Request 3 underlying the decision under appeal did not preclude that, in addition to backwash fluid sufficient to create the desired flow upwards through the module, a feed flushing was also used.

In response to the statement setting out the grounds of appeal of the opponents, the proprietors submitted further observations (letter of 18 October 2007), *inter alia* stressing the difference between a feed-and-bleed process and a process cycling between permeation and deconcentration.

VI. In their statement setting out the grounds of appeal, the opponents enclosed, as Annex D0\_1<sup>mtd</sup>, a feature analysis of Claim 1 of Auxiliary Request 3, and, as Annex D0<sup>mtd</sup>, the amended specification, both underlying the decision under appeal.

In response to the statement setting out the grounds of appeal by the proprietors, the opponents attacked the new main request (claims as granted) by reference to T 0676/04 of 20 September 2006 (letter of 12 October 2007).

- VII. In response to a communication of the Board in preparation for oral proceedings, in which the Board drew attention to the points to be discussed:
- (a) The opponents raised objections of lack of novelty having regard to, *inter alia*, D2 and lack of an inventive step having regard to e.g. D4 as the closest prior art, combined with common general knowledge and/or any of the cited documents (other than D3) (letter of 23 February 2011).
  - (b) The patent proprietors submitted their requests and their observations (letter of 14 March 2011).
- VIII. Oral proceedings were held on 14 April 2011. The patent proprietors withdrew the Main Request (claims as granted), Auxiliary Request 1 (Main Request underlying the decision under appeal), Auxiliary Request 2 (Auxiliary Request 1 underlying the decision under appeal) and Auxiliary Request 3 (Auxiliary Request 2 underlying the decision under appeal). Then, Auxiliary Request 3 underlying the decision under appeal became their Main Request. Finally, fresh Auxiliary Requests 1 to 5 were submitted. At the end of the oral proceedings, the decision was announced.
- IX. Claim 1 of each of Auxiliary Requests 2 and 4 read respectively as follows (compared to Claim 1 as granted, additions are in bold, deletions in strike-through):

*Auxiliary Request 2*

- "1. A process of filtering water, comprising the repetition of a filtration cycle having:
- (c) a permeation step wherein
    - (i) feed water enters a tank; and
    - (ii) a similar volume of permeate is withdrawn from the tank by suction on an inner surface of submerged filtering membranes arranged in modules (10); and
  - (d) a deconcentration step wherein
    - (iii) scouring bubbles rise through the modules;
    - (iv) the membranes are backwashed with permeate, ~~or a flow of feed water is provided from below the membranes, or both;~~ in such a way that **the backwash causes**
    - (v) water containing solids **to** flows upwards through the modules to exit the tank from a point above the modules."

*Auxiliary Request 4*

- "1. A process of filtering water, comprising the repetition of a filtration cycle having:
- (e) a permeation step wherein
    - (i) feed water enters a tank; and
    - (ii) a similar volume of permeate is withdrawn from the tank by suction on an inner surface of submerged filtering membranes arranged in modules (10) **wherein the modules cover more than 90% of the horizontal cross-sectional area of the tank;** and
  - (f) a deconcentration step wherein
    - (iii) scouring bubbles rise through the modules;

- (iv) the membranes are backwashed with permeate, ~~or a flow of feed water is provided from below the membranes, or both;~~ in such a way that **the backwash causes**
- (v) water containing solids **to** flows upwards through the modules to exit the tank from a point above the modules."

X. The opponent appellants have essentially argued as follows:

*Main Request (Auxiliary Request 3 underlying the decision under appeal and allowed by the Opposition Division)*

*Novelty*

The Main Request comprised one independent claim concerning a process of filtering water comprising a deconcentration step based on the backwashing of the membranes with the permeate.

Figure 5 of D2 and its detailed description disclosed a process of filtering water comprising the repetition of a filtration cycle having a permeation step and a deconcentration step. As to the permeation step, feed water entered from the lower part of tank 15 and a volume of permeate was withdrawn from the tank by suction on inner surface of membranes 5 arranged in a module 4. The deconcentration step included the rising of air bubbles through the module and a backwash with permeate, as well as a periodical draindown of the tank to remove the concentrated water. According to D2, the draindown could be replaced by pumping feed water into



the base of the tank at regular intervals to overflow the concentrated water at the top of the tank.

Since the process of in Claim 1 of the Main Request did not require that the flow of the concentrated water from the tank be caused by the backwash permeate, D2 was novelty-destroying.

*Inventive step*

If novelty over D2 were acknowledged, i.e. if a difference were seen in the periodical draindown of the tank of D2 to remove the concentrated retentate, D2 then described the closest prior art.

No effect whatsoever had been shown, let alone any improvement, so that the problem solved over D2 was the mere provision of an alternative process.

An alternative process fulfilling the definition of Claim 1 of the Main Request was suggested in D2 itself (i.e. flushing with feed water). Hence, the claimed process was not inventive.

*Auxiliary Requests 1 to 5*

*Procedural matters*

All of auxiliary requests 1 to 5 submitted at a late stage of the oral proceedings were unjustifiably late and could not be considered as a reaction to the discussion on D2, which had always been relevant in the proceedings, discussed in detail since the very beginning of the opposition proceedings and mentioned

in the communication by the Board in preparation for oral proceedings.

Furthermore, apparatus claims were now included in Auxiliary Requests 1 and 3 and made up Auxiliary Request 5, although they had been withdrawn or no longer pursued in the previous proceedings.

Hence, the fresh requests were not in compliance with the Rules of Procedure of the Boards of Appeal of the EPO (RPBA) (OJ 2007, 536).

Also, the fresh process claims were based on new limitations such as "the backwash causes", that appeared to be disclosed originally (Article 123(2) EPC) but which had not been claimed before, and hence not dealt with.

Therefore, the fresh requests should not be admitted into the proceedings.

*Novelty and inventive step*

The most pertinent prior art was still disclosed by D2. The alleged economy of the cycle attained was disputed, so that the problem solved did not change. As to obviousness, attention was drawn to D4, disclosing the possibility of covering the entire area of a rectangular tank with as many membrane modules as possible.

XI. The appellant patent proprietors have essentially countered as follows:

*Main Request (Auxiliary Request 3 underlying the decision under appeal and allowed by the Opposition Division)*

*Novelty*

D2 disclosed a process of filtering water in which a module was operated in dead-end filtration mode with periodic backwashes. However, the process of D2 used a different deconcentration step, namely one including a periodical draindown of the tank. Hence, the claimed process was novel over that of D2.

*Inventive step*

D2 rather than D1 or D4 was the document describing the closest prior art for assessing inventive step, because its dead-end filtration process was of the type defined in Claim 1 of the Main Request.

Since the deconcentration step of D2 included a periodic draindown of the tank, which implied a waste of time and water, the problem to be solved by the process of Claim 1 of the Main Request was to render more efficient the known process.

The claimed process was tightly tied up with the idea of using permeate to deconcentrate, which had not been done before. D2 did not suggest at all to use the backwash with permeate to cause the water containing the solids removed from the surface of the membranes to overflow the tank, so the claimed process was not obvious from D2.

*Auxiliary Requests 1 to 5*

*Procedural matters*

All of Auxiliary Requests 1 to 5 submitted at the oral proceedings were in reaction to arguments submitted for the first time during the oral proceedings and never discussed before, as the previous proceedings had focussed on D1 rather than on D2.

The amendments made had a clear basis in the original application, which disclosed the rise of the level of the tank due to the backwash permeate as well as the 90% coverage of the cross-sectional area of the tank.

Therefore, the fresh requests were admissible.

*Novelty and inventive step*

The claimed process of each of Auxiliary Requests 2 and 4 was more limited than the process of Claim 1 of the Main Request, so that it was novel.

None of the documents invoked, let alone D2, disclosed or suggested using the permeate to deconcentrate, nor filling the tank as densely as possible (crowded) with modules, without downcomers, so that a rapid rise of the level of the solid rich water by the permeate improved the economy of the cycle, in particular in terms of more economical times.

D4 concerned a feed-and-bleed reactor and did not disclose that filling 90% of the section of the tank

with modules was usual. Also, the dense packing allegedly taught by D4 did not exclude any downcomers.

Since the skilled person had no motivation at all to use the permeate to deconcentrate and to fill the tank with modules, the process claimed in any of Auxiliary Requests 2 and 4 was not obvious over D2.

XII. The appellant patent proprietors requested that the decision under appeal be set aside and the patent be maintained on the basis of the Main Request (Auxiliary Request 3 underlying the decision under appeal) or one of Auxiliary Requests 1 to 5 submitted at the oral proceedings before the Board.

XIII. The appellant opponents requested that the decision under appeal be set aside and the patent be revoked.

### **Reasons for the Decision**

1. The appeal is admissible.

*Main Request (Auxiliary Request 3 underlying the decision under appeal)*

*Closest prior art*

2. The patent in suit concerns an overflow process and an immersed membrane filtration system.

2.1 It is not contested that an immersed membrane filtration system that can be operated as defined in Claim 1 of the Main Request is disclosed by D2, which,

like the patent in suit, aims at providing a simple and effective filtration system as well as a method for removing fouling materials from the surface of the porous membranes by use of gas bubbles (page 2, lines 22-24).

2.2 D2 discloses a method of removing fouling materials from the surface of a plurality of porous membranes arranged in a membrane module by providing, from within the module, by means other than gas passing through the pores of said membranes, gas bubbles in a uniform distribution relative to the porous membrane array such that said bubbles move past the surfaces of said membranes to dislodge fouling materials therefrom, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween (Claim 1). The porous membranes comprise hollow fibre membranes (Claim 4).

2.3 The membrane module of D2 comprises a plurality of porous membranes, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween, and means for providing, from within the module, by means other than gas passing through the pores of said membranes, gas bubbles such that, in use, said bubbles move past the surfaces of said membranes to dislodge fouling materials therefrom (Claim 10).

2.4 The filtration system of D2 includes a membrane module positioned vertically in a tank containing feed liquid to be filtered and including means to apply a transmembrane pressure to said fibres in said array to cause filtrate to pass through pores in said fibres and

means to supply continually or intermittently a supply of gas to said means for providing gas bubbles such that said gas bubbles move upwardly and uniformly between said fibres to scour the outer surfaces thereof (Claim 34). In particular, a backwash is used in conjunction with the scouring process to assist solids removal from the membrane pores and outer surface of the membranes (Claim 35).

- 2.5 Since D2 pertains to the technical field of the patent in suit, aims at similar objectives and discloses a similar installation, it describes the closest prior art.

*Problem and Solution*

3. The patent in suit (paragraph [0007]) addresses the problem of improving over the prior art immersed membrane water filtration systems as shown in Figure 1 or acknowledged in the description, in which solid rich retentate is continuously or periodically drained from the tank (Paragraph [0002]).

- 3.1 More particularly, the patent in suit aims at operating the membrane modules with minimal channeling or dead zones when water flows through the modules (column 3, lines 29-31). To attain this, the membrane modules not only fill most of the horizontal cross-sectional area of the tank, without downcomers outside the perimeter of the modules (paragraph [0015]), but the tank itself. In particular, the modules are stacked on top of each other and aligned such that water can flow vertically through the stack (column 3, lignes 12-14), as shown in Figure 2. By then keeping the flux below 60 or even 40

- l/m<sup>2</sup>h (Paragraph [0026]), surprising little fouling occurs and periodic deconcentration steps are usually sufficient. Also, despite the low flux, high tank velocities are attained, comparable to those of sand filters. Furthermore, by operating at low flux and low aeration, the savings produced thereby more than offset the cost of filling the tank with membrane modules. Finally, the resulting recovery rates are generally adequate even with strong deconcentration.
- 3.2 D2 is not acknowledged in the patent in suit. Having regard to its periodic draindown, it may however be considered as resembling the filtration system shown in Figure 1 of the patent in suit.
- 3.3 Having regard to D2 as the closest prior art, no improvement whatsoever has ever been demonstrated by evidence.
- 3.4 Moreover, the process of Claim 1 of the Main Request does not require any filling with modules of the horizontal cross-section of the tank, let alone of the tank itself, nor the absence of any downcomers. Low flux and low aeration are not specified either. Consequently, in the absence of the necessary structural and operational means as disclosed by the patent in suit, it is not apparent that the alleged improvements are obtainable by a process as defined in Claim 1 of the Main Request.
- 3.5 Hence, the problem solved by the claimed process can only be the provision of a further process of water filtration with immersed hollow fibre membranes.



*Obviousness*

4. The closest embodiment illustrated by D2 is shown in Figure 5 and described in detail on page 9, lines 16-25.

4.1 In that embodiment, a module 4 of hollow fibre membranes potted at their ends is arranged vertically in a cylinder tank 15 so that filtrate (i.e. permeate) is withdrawn from the top potting head 6 of the module by suction. Air is introduced into the bottom of the module 4 to produce air bubbles between the fibres which scrub solids accumulated on the surface of the membranes. To remove solids clogged within the membrane pores, a small quantity of permeate is pumped through the fibre lumens as a permeate backwash. One method of operation of the system of Figure 5 of D2 comprises running suction for 15 minutes, then aeration for 2 minutes and 15 seconds. After the first minute of aeration, a permeate backwash is introduced for 15 seconds. Then, the cycle returns to suction. After several cycles, the solids in the cylinder tank 15 are concentrated and the water in the tank 15 is consequently drained down to remove the concentrated backwash.

4.2 The claimed process differs from the operation of the closest embodiment of D2 in the deconcentration step, which does not include a draindown of the tank.

4.3 However, still according to D2 (page 5, lines 1 to 5), apart from draindown, other methods can be used for removal of accumulated solids, including overflow at the top of the tank by pumping feed into the base of the tank at regular intervals at a rate sufficient to

- cause overflow and removal of accumulated solids, to be typically done at the end of a backwash cycle.
- 4.4 Pumping feed water into the base of the tank at regular intervals, after backwashing, is a further alternative deconcentration step illustrated in the patent in suit (paragraph [0022], column 3, lines 17-23) and anyhow encompassed by Claim 1 of the Main Request, having regard in particular to the expression "in such a way that" of the deconcentration step.
- 4.5 This interpretation of Claim 1 of the Main Request made by the Board is confirmed by the request made by the patent proprietors in their statement setting out the grounds of appeal (page 3) for reinstatement into the description of the removed feed flushing method, which in their opinion was not precluded even in the case of the Main Request.
- 4.6 It follows from the foregoing that the skilled person starting from D2 to provide a further process of filtering water with an immersed membrane system finds in D2 itself a suggestion to modify the closest embodiment of D2 in a way that inevitably leads to the claimed process.
- 4.7 Therefore, the process of Claim 1 of the Main Request was obvious.

*Auxiliary Requests 1 to 5 - Admissibility*

5. Auxiliary Requests 1 to 5 were filed during the oral proceedings before the Board, i.e. late.

5.1 These late-filed claim requests are made up as follows:

- (a) Auxiliary Requests 1 and 3 comprise an independent process Claim 1 and an independent reactor claim, respectively Claim 9 and Claim 8;
- (b) Auxiliary Requests 2 and 4 only comprise process claims; and,
- (c) Auxiliary Request 5 only comprises reactor claims.

5.2 As regards the amendments, compared to the Main Request, the picture is as follows:

- (a) Claim 1 of each of Auxiliary Requests 1 to 4 includes the amendment "the backwash causes", before step (b)(v);
- (b) Claim 1 of each of Auxiliary Requests 3 and 4 additionally (i.e. over Claim 1 of Auxiliary Requests 1 and 2, respectively) comprises, in step (a)(ii) the additional features of Claim 3 as granted ("wherein the modules cover more than 90% of the horizontal cross-sectional area of the tank");
- (c) Claim 9 of Auxiliary Request 1 includes, in step (c), the additional features of Claim 10 as granted ("from below the one or more modules"). So do Claim 8 of Auxiliary Request 3 and Claim 1 of Auxiliary Request 5.

5.3 The legal framework for the admissibility of *inter alia* late filed claim requests is established by Article 13 RPBA, which specifically deals with the amendment to a party's case. In particular:

- (a) Article 13(1) RPBA generally specifies the principle of the Board's discretion for any amendments to a party's case after the filing of the grounds of appeal or any reply, whereby a non-

exhaustive list of criteria for the exercise of the discretion is given, which includes the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

- (b) Article 13(3) RPBA specifically deals with amendments sought after oral proceedings have been arranged, hence also during oral proceedings, and prescribes that the amendments should not be admitted if they raise issues which the Board or the other parties cannot reasonably be expected to consider without adjournment of the oral proceedings.

5.4 Auxiliary Request 3 underlying the decision under appeal (now Main Request), which was found to fulfil the requirements of the EPC, only contained process claims. Auxiliary Requests 1 and 2 both contained an independent reactor Claim 9, which is identical to Claims 9, 8 and 1, respectively, of present Auxiliary Requests 1, 3 and 5, and the subject-matter of which was found to lack an inventive step having regard to D4. Hence, the reactor claims were not allowable.

5.5 In their statement setting out the grounds of appeal, the appellant patent proprietors reverted to the claims as granted as their Main Request and also maintained the Main Request and Auxiliary Requests 1 and 2 underlying the decision under appeal. In their latest letter (of 14 March 2011) before the oral proceedings, the appellant proprietors mentioned the possibility of further amendments to the reactor claim as well as of claim requests only comprising apparatus claims, but no formally written claim request was ever presented.

Finally, during the oral proceedings, the claim requests underlying the decision under appeal and containing apparatus claims were withdrawn, so that the oral proceedings essentially dealt with process Claim 1 of the Main Request. Hence, until the late point in time at which Auxiliary Requests 1 to 5 were formally presented, no discussion whatsoever had been carried out on the apparatus claims.

5.6 The amendments to process Claim 1 of e.g. Auxiliary Requests 2 and 4 were clearly consequential to the discussion held during the oral proceedings and were such that the opponents could deal with them without adjournment of the oral proceedings, so that the Board exercised its discretion and admitted them into the proceedings pursuant to Article 13(3) RPBA.

5.7 In contrast, the claim requests containing also or solely reactor claims (i.e. Auxiliary Requests 1, 3 and 5) were not a reaction to the discussion held on the process of Claim 1. These claim requests, which could have been formally presented much earlier, would then have required a new discussion, which would have unduly prolonged the appeal proceedings beyond oral proceedings, thus affecting the procedural economy mentioned in Article 13(1) RPBA. As regards Auxiliary Request 5, which contained solely apparatus claims, it did even not underlie the decision under appeal. Hence, the Board exercised its discretion not to admit them.

*Auxiliary Requests 2 and 4*

*Amendments*

6. Compared to Claim 1 of the Main Request (Point IV, *supra*), Claim 1 of Auxiliary Request 2 (Point IX, *supra*) contains, in step (b)(iv), the amendment "the backwash causes" (the overflow).

6.1 The amendment is not contested by the opponents, who acknowledged that it has a basis e.g. on page 6, lines 19-22 of the application as filed. The Board has no reason to take a different position.

6.2 As regards Auxiliary Request 4, its Claim 1 (Point IX, *supra*), compared to Claim 1 of Auxiliary Request 2, additionally comprises, in its step (a)(ii), the features of Claim 3 as granted (which are identical to those of Claim 3 as originally filed).

6.3 The amendments aim at overcoming a ground of opposition.

6.4 Therefore, the amended Claim 1 of each of Auxiliary Requests 2 and 4 is formally allowable.

*Inventive step*

7. D2 still describes the closest prior art, although both amended features now defined in the respective Claim 1 are not disclosed by D2.

7.1 As regards the limitation that the backwash causes the overflow of the concentrated retentate, D2 merely discloses that the permeate is used to unclog the pores of the membranes, e.g. for a short time. Whether or not such a small amount of permeate is suitable to cause the overflow of the retentate is neither disclosed nor suggested by D2. However, since the permeate is

costlier than feed water, such a measure per se cannot lead to any economy of the cycle.

- 7.2 As to the 90% coverage of the horizontal cross-sectional area of the tank by the modules, almost 10% of the section is still free, which might cause channeling, if not used as a downcomer. Moreover, that limitation says nothing about the filling of the tank with modules, e.g. whether or not the modules are stacked on top of each other and aligned within the whole volume of the tank.
- 7.3 Finally, Claim 1 of each of Auxiliary Requests 2 and 4 still does not define any low flux and low aeration, so that the alleged improvements mentioned in the patent in suit do not appear to be plausibly attainable by a process as defined in Claim 1 of Auxiliary Request 4.
- 7.4 It follows from the foregoing that the problem solved is still the provision of a further process of filtering water with an immersed membrane system.
- 7.5 As to obviousness, the known fact that permeate is costlier than feed water, so that its use is not always preferable, does not mean that its use e.g. for flushing is not obvious for the skilled person, especially when, as in the present case, the disadvantages are clearly predictable. A predictably disadvantageous modification of a process, in the present case that of D2, wherein the predictable disadvantages are not compensated by any unexpected technical advantage, cannot be inventive (Case Law of the Boards of Appeal, 6th edition 2010, I.D.8.5).

7.6 As regards the 90% coverage of the horizontal cross-section of the tank, such a measure is known from D4 (Column 23, lines 46-49), where it is applied to a rectangular tank as shown in Figures 9, 9A and 10, in a way such that "there will typically be as many assemblies (= modules) in a tank as it can hold, so that essentially the entire area of the tank is covered with fibres". D4 is acknowledged in D2, which aims at more effective and simple systems than those of e.g. D4. Hence, the use of a plurality of modules to cover almost the entire cross-sectional area of the tank in a process as disclosed by D2 was obvious for the skilled person merely seeking a further process.

7.7 Consequently, the claimed subject-matter of Claim 1 of each of Auxiliary Requests 2 and 4 is not inventive.

### *Conclusions*

8. One of the invoked grounds of opposition under Article 100(a) EPC (lack of an inventive step) prejudices the maintenance of the patent in suit in the amended form of the Main Request as well as in the amended form of any of Auxiliary Requests 2 and 4. Auxiliary Requests 1, 3 and 5 are not admissible.



**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent in suit is revoked.

The Registrar:

The Chairman:

G. Magouliotis

J. Riolo