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**Datasheet for the decision
of 17 March 2009**

Case Number: T 0972/05 - 3.3.05

Application Number: 94905166.8

Publication Number: 0682554

IPC: B01D 33/04

Language of the proceedings: EN

Title of invention:
Filtration process

Patentee:
ADVANSA B.V.

Opponent:
Pannevis B.V.

Headword:
TPA filtration/ADVANSA BV

Relevant legal provisions:
EPC Art. 56, 107, 108
EPC R. 140

Relevant legal provisions (EPC 1973):
EPC R. 89

Keyword:

"Re-dating of decision and correction of mailing date not possible under Rule 89 EPC 1973 (Rule 140 EPC)"

"Opponent's notice and grounds of appeal filed late - appeal not admissible"

"Patentee's grounds of appeal filed late - appeal nevertheless admissible applying the principle of protection of legitimate expectations"

"Terephthalic acid (TPA) filtration method using a vacuum belt filter made available to public - yes"

"Novelty of TPA filtration method as now claimed - yes"

"Inventive step - yes: No motivation to design method as claimed"

Decisions cited:

T 0124/93, T 0116/02

Catchword:

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Case Number: T 0972/05 - 3.3.05

DECISION
of the Technical Board of Appeal 3.3.05
of 17 March 2009

Respondent:
(Opponent) Pannevis B.V.
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Appellant I:
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
18 May 2005 concerning maintenance of the
European Patent No. 0682554 in amended form.

Composition of the Board:

Chairman: G Raths
Members: H Engl
C Vallet
B Czech
S Hoffmann

Summary of Facts and Submissions

I. European patent EP-B-0 682 554 was based on the European patent application No. 94 905 166.8, filed on 24 January 1994 with a claimed priority date of 5 February 1993. The patent was granted with 19 claims.

II. Claim 1 thereof reads as follows:

"1. A method of displacing carboxylic acid-containing mother liquor comprising acetic acid or water from a solids material in the form of terephthalic acid crystals which are slurried in said mother liquor, said method comprising:

forming the solids material into a layer on a movable filter medium (100);

transporting the layer by means of the filter medium through a washing zone (Z2) in which the layer is contacted along the path of movement thereof with a wash medium, the wash medium serving to displace mother liquor from the layer and passing through the filter medium (100); said method characterised by establishing over said layer an inert gaseous atmosphere from which inert gas passes through the layer; and supplying inert gas to the gaseous atmosphere so as to produce a concentration gradient within the gaseous atmosphere such that the mother liquor content of the gas passing through said layer increases in a direction counter-current to the direction of travel of said layer."

III. The opposition grounds were lack of novelty and lack of inventive step (Article 100(a) EPC). The opposition was rejected on the reasoning that there was no evidence that a process involving a vacuum belt filter for

filtering and purification of terephthalic acid (TPA) had been made public.

IV. The following documents were *inter alia* considered:

- D3: Letter of Massimo Ravizza (ING. RAVIZZA & C.) to Lex Orizand (Pannevis bv) dated 23 January 1987
- D6: Drawing Pannevis RT belt filter No. 86144.1-A
- D8: SISAS Order for a Pannevis belt filter for TPA (12 February 1987)
- D12: Proforma Invoice from Pannevis to Sisas, dated 5 March 1987
- D13: Invoice from Pannevis to Sisas, dated 24 June 1987
- D14: Proforma Invoice from Pannevis to Sisas, dated 6 July 1987
- D15: Notice of delivery of Pannevis belt filter to SISAS (1 July 1987)
- D16: Drawing No. 003131, dated 27 May 1987
- D25: Declaration of Piero Cugnasca, dated 27 September 2001
- D26: Declaration of Franco Codignola, dated 27 September 2001
- D31: Secrecy agreement between Pannevis bv and ICI Chemicals & Polymers Ltd, dated 14 June 1991.

V. Following a first appeal by the opponent, this board (in a different composition) set aside the contested decision and remitted the case to the opposition division for further prosecution, in particular for hearing the witnesses Mr Cugnasca and Mr Codignola offered by the appellant. See Order and point 4 of the Reasons of decision T 0116/02 of 31 January 2003.

The board also considered the following documents:

- D34: Letter from Pannevis (Mr Prinssen) to DuPont
(Mr Hirsch) dated 3 December 1998
- D36: Declaration of Dr G. Aird, dated 25 October 2002
- D39: Declaration of Dr Massimo Ravizza, dated
28 January 2003
- D40: Declaration of Mr Prinssen, dated 24 January 2003

On the substance of the case, the board noted that *"it was undisputed that before the priority date of the patent in suit isophthalic acid was produced at the Sisas premises, whereby a slurry of the acid was filtered and washed on a belt-filter bought from and installed by Pannevis and functioning as indicated in D6 and D16."* The respondent had not provided evidence for any secrecy arrangement between Pannevis and Sisas in this respect.

The board concluded *"that it was beyond reasonable doubt that the operation of the Pannevis belt filter for the production of isophthalic acid at the Sisas premises, and at least its potential use for the preparation of terephthalic acid, was publicly known before the priority date of the patent in suit."*

- VI. Having heard the witnesses as requested by the board, the opposition division decided to maintain the patent in amended form on the basis of the claims of the third auxiliary request then on file. Claim 1 thereof was based on a combination of the features of claims 1 to 4 as granted.

The opposition division additionally relied on the following documents (filed subsequently to decision T 0116/02):

D37: Second Declaration of Dr G. Aird, dated
19 November 2004

D38: Declaration of Mr J. Turner, dated
19 November 2004

VII. From the testimony of the witnesses and the written statements, the opposition division considered it proven that only isophthalic acid (IPA) was purified on the belt filter purchased from and installed by Pannevis at the SISAS plant. Also the following process features were made public (see Reasons, point 3.2):

- a nitrogen blanket over the belt for safety purposes, said blanket having a small, almost static counter-current flow, but a main downward flow;
- a continuous feed of nitrogen by one of the two available blowers, at the downstream end of the filter; and
- a transfer of acetic acid vapours from the wash liquid into the nitrogen blanket, reaching an equilibrium.

However, the opposition division held that it had not been proven beyond reasonable doubt that TPA process aspects were discussed with ICI representatives during their visit to SISAS in October 1991 (Reasons, point 3.3).

The opposition division concluded that the combined measures of separating the recycled gas into two streams, their individual treatment and the feeding of the purer stream downstream of the less pure stream prevented the problem of re-contamination of TPA by the recycled inert gas. No available document would have suggested these measures.

- VIII. The interlocutory decision of the opposition division was posted on 18 May 2005 and was accompanied by the Minutes of oral proceedings, but apparently not by the Minutes of taking evidence. It is this interlocutory decision against which the present appeals lie.

Following a letter of the opponent dated 13 June 2005 asking for the missing Minutes of taking of evidence and inviting the opposition division to set a new date for appeal, the cover sheet of the interlocutory decision (EPO form 2327) was posted a second time on 24 June 2005, together with the Minutes of taking of evidence.

In a further brief communication to the parties dated 2 August 2005, the opposition division stated: "*The interlocutory decision is dated 24.6.2005.*"

- IX. The patentee's appeal was filed with letter dated 25 July 2005. With the letter stating the grounds for appeal dated 2 November 2005, the patentee (henceforth: appellant I) filed amended sets of claims as first and second auxiliary requests, the main request being directed at the claims as granted. As a third auxiliary request, the appellant requested to maintain the patent

on the basis of the claims allowed by the opposition division in the contested decision. Additional submissions were received with letters dated 24 March 2006, 28 April 2006 and 7 August 2006.

- X. The notice of appeal of the opponent (henceforth: appellant II) was filed on 29 August 2005 and the grounds of appeal were received with a letter dated 24 October 2004. Also filed were the documents

D41: Declaration of K. Kuhlen, dated 24 October 2005;

and later

D41a: Original of the Declaration of K. Kuhlen, dated 24 October 2005 (differing from D41 slightly in layout).

- XI. After having invited the parties to comment on the question of the admissibility of the late filed appeals of the patentee and the opponent, the board commented on the parties' replies in its communication of 21 January 2009 on that matter. It was - *inter alia* - provisionally considered that both the notice of appeal and the grounds of appeal of appellant II were filed too late and that the appeal thus appeared inadmissible.

- XII. Oral proceedings took place on 17 March 2009 in the absence of appellant II who previously had informed the board that it would not attend.

Appellant I withdrew its main request, but maintained the auxiliary requests I to III, as filed with the statement of grounds of appeal.

XIII. Claim 1 of the set of claims 1 to 18, filed with the statement of grounds of appeal as the first auxiliary request, reads:

"1. A method of displacing carboxylic acid-containing mother liquor comprising acetic acid or water from a solids material in the form of terephthalic acid crystals which are slurried in said mother liquor, said method comprising:

forming the solids material into a layer on a movable filter medium (100);

transporting the layer by means of the filter medium through a washing zone (Z2) in which the layer is contacted along the path of movement thereof with a wash medium, the wash medium serving to displace mother liquor from the layer and passing through the filter medium (100); []

establishing over said layer an inert gaseous atmosphere from which inert gas passes through the layer; []

supplying inert gas to the gaseous atmosphere so as to produce a concentration gradient within the gaseous atmosphere such that the mother liquor content of the gas passing through said layer increases in a direction counter-current to the direction of travel of said layer,

wherein said concentration gradient is produced by effecting flow of said gas in countercurrent relation with the direction of travel of the layer of solids material whereby liquor evaporating from the layer of solids material in said zone (Z2) and upstream of said zone is substantially prevented from passing downstream of said zone."

Additions and omissions [] with respect to claim 1 as granted appear in **bold**.

XIV. The arguments of appellant I, insofar as they are relevant for the present decision, were:

i On the admissibility of the appeal:

The notice of appeal of the patentee (appellant I) was filed timely. However, in view of the second communication of the opposition division under Articles 102(3) and 106(3) EPC posted 24 June 2005 and of the communication dated 2 August 2005, and in view of the deadlines for filing the grounds of appeal as published in the EPO Register, the appellant had assumed that the time limit for filing said grounds was not 28 September 2005, but the later date of 4 November 2005. Should this turn out to be incorrect, the patentee submits having been misled by an incorrect office action about the time limit for filing the grounds of appeal. On the principle of legitimate expectations, the patentee's grounds should be considered as filed in due time. Failing this, *restitutio in integrum* under Article 122 EPC was requested.

ii On the substance of the appeal:

The arrangement at SISAS had only been used for IPA, not for TPA. A filtering process having both a counter-current concentration gradient of acetic acid and a counter-current nitrogen flow had not been made available to the public. Although the opposition

division had held that there was "a very small, almost static counter-current flow" of nitrogen, this was not confirmed by the witnesses who could not find common ground on this point. Hence this was not proven beyond reasonable doubt, which was the standard of proof in an instance of alleged prior use.

The opposition division had also neglected Mr Cugnasca's testimony stating that the nitrogen gas introduced into the filter housing was saturated with acetic acid as a result of the pumps used for introducing said gas. Said pumps were Siemens acetic acid sealed liquid ring pumps, as noted by Dr Aird (D36, D37) and confirmed by witness Mr Cugnasca. As the nitrogen was already saturated, it could not absorb additional acetic acid in the upstream region of the filter belt, so as to establish a concentration gradient.

Moreover, according to Dr Aird's observations (D37), the inert gas entry point used by SISAS was located at a position upstream the belt, approximately one third of the length of the belt's casing from the feed end; any possible concentration gradient was therefore predominantly co-current rather than counter-current.

Hence, there was no basis for assuming that during operation at SISAS a counter-current concentration gradient as per claim feature (g) existed.

On the contrary, appellant I accepted that nitrogen gas flowed co-currently in the SISAS process, *i.e.* from the upstream end of the filter, according to what had been disclosed to the appellant's Dr Aird during his visit

and as testified in D36 and D37. Under this scenario, the opposition division had argued that an increasingly cleaner wash water might have reduced the acetic acid content in the nitrogen gas below the point of saturation, thereby giving rise to the concentration gradient as required by claim 1. However, this scenario relied on several unproven assumptions concerning gas scrubber geometry, height of the wash water distributors above the filter cake and time available for reaching equilibrium, for none of which there was an unequivocal basis. Again, the standard of proof required for a legal decision was not met.

XV. The arguments of appellant II, insofar as they are relevant for the present decision, were essentially the following:

i On the admissibility of the appeal:

The correct date of notification of the interlocutory decision of the opposition division was in this case 24 June 2005, the previously issued notification having been incomplete. Only when the Minutes of taking of evidence were finally provided by the letter stating that the interlocutory decision was dated 24 June 2005, were both parties in possession of the complete file contents resulting from the Oral Hearing and thus in full possession of the grounds, facts and evidence required for filing an appeal.

ii On the substance of the appeal:

Having regard to what had been decided in T 0116/02, ICI's visit to the SISAS plant was not subject to any

confidentiality between SISAS and Pannevis. Consequently, the claim feature relating to the production of terephthalic acid (TPA) on a belt filter was known and public. The remaining claim features were neither novel nor inventive, as acknowledged by the opposition division in the contested decision.

Appellant II refuted Dr Aird's statement that the problem addressed by the patent in suit had not been known. It relied on Mr Kuhlen's declaration D41 according to which the absorption of acetic acid from the inert gas into TPA and IPA filter cakes in a Pannevis belt filter was a phenomenon well-known before the priority date of the patent. In view of the much larger particle size of TPA and in view of the desire to reduce the amount of wash water in the process, a skilled person would modify the SISAS process so as to reduce the amount of gas-borne acetic acid. Further logical steps would have been to increase the inert gas recirculation rate and to re-introduce the cleaned inert gas at more than one point along the belt filter, as illustrated by D6 and D16 and as present in the SISAS installation. The skilled person would have realised that a concentration gradient, with regard to acetic acid, existed within the belt filter, whereby the inert gas atmosphere would have been richer in acetic acid near the point of entry of acetic acid into the belt filter than further along the belt filter towards the exit. This was stated in D41 and confirmed by Mr Cugnasca's testimony. The Pannevis filter supplied to SISAS provided two introduction points for nitrogen, one downstream of the other. In view of this, the skilled person faced with the problem of reducing the wash water and reducing the problem of water influx

when utilizing such a Pannevis belt filter for the filtration of the much larger TPA crystals, would firstly ensure that the atmosphere was as clean as possible and secondly ensure that the downstream gas stream was cleaner, *i.e.* had a lower acetic acid concentration than the stream re-introduced further upstream, so that the larger, already washed TPA crystals would not be re-contaminated with acetic acid just before leaving the filter belt.

The patentee's argument that the nitrogen circulated in the Pannevis filter at SISAS would have been saturated with acetic acid due to the use of acetic acid sealed liquid ring pumps, so that no concentration gradient existed, was not correct. The gaseous atmosphere within the belt filter comprised not only nitrogen, but also water vapour, acetic acid vapour, unreacted reagents, catalysts and contaminants, all contained in the mother liquor. The amount of these components was automatically greater in the gaseous atmosphere in the region of the belt filter where the slurry was introduced and the acetic acid wash carried out, than in the region where the cake was submitted to the final washing with water and steam before exiting. The gas in the "*sucking dry section*" was almost saturated with moisture (water vapour) and had the effect of diluting the sealing acetic acid of the vacuum pump during its passage through the pump whereby the returning gas transported only a small amount of acid and thus in no way prevented the formation of a concentration gradient.

XVI. Requests:

Appellant I (the patent proprietor) requested that the decision under appeal be set aside and the patent be maintained on the basis of one of the sets of claims filed with letter of 2 November 2005 as first and second auxiliary request, or in the alternative, that the patent be maintained on the basis of the claims allowed by the opposition division.

Appellant II (the opponent) had requested in writing that the decision under appeal be set aside and that the European patent No. 0 682 554 be revoked.

Reasons for the Decision

1. *Procedural matters*

- 1.1 The contested decision was signed by the opposition division on 1 March 2005 and was posted on 18 May 2005. However, the decision was sent without being accompanied by the Minutes of taking of evidence.

Said Minutes were dispatched with a subsequent letter of the opposition division dated 24 June 2005, under the cover letter of the first sheet of the interlocutory decision (EPO Form 2327). In a further brief communication to the parties dated 2 August 2005, the opposition division stated: "*The interlocutory decision is dated 24.6.2005.*"

- 1.2 However, the opposition division had no power to re-date its decision under Rule 89 EPC 1973 (Rule 140 EPC)

(see decision T 0124/93 of 10 August 1995, Reasons point 1.1). Nor could the opposition division change the mailing date of the decision once it was correctly notified to the parties, in order to re-start the time limit for filing an appeal according to Article 108, first sentence, EPC. The mailing date is a fact which cannot be corrected for example under Rule 89 EPC 1973. The circumstance that the Minutes of taking of evidence were missing is not of relevance, as both parties were in possession of the decision itself which alone forms the basis for the appeal.

1.3 According to Article 108 EPC, the time limit for filing an appeal is two months after notification of the decision on 18 May 2005. Allowing 10 days for post services, the non-extendable time limit for filing the appeal expired on 28 July 2005.

1.4 It results from the above considerations that the notice of appeal of appellant I, filed on 25 July 2005, was filed in good time; whereas its statement of grounds of appeal was filed late on 2 November 2005. However, the board accepts that appellant I was misled by the letter of the opposition division which stated a later date for the decision. Applying the principle of protection of legitimate expectations according to which communications of the EPO can be relied upon, the appeal of appellant I is thus considered admissible (see decision T 0124/93 of 10 August 1995, Reasons point 1.1).

1.5 The opponent's (appellant II) notice of appeal was filed on 29 August 2005 and the grounds for appeal were filed on 24 October 2005, both dates being after the

expiry of the time limit for the appeal on 28 July 2005, triggered by the notification of the decision posted 18 May 2005. Hence both letters were filed too late.

Appellant II cannot, in the board's view, rely on having been confused by the opposition division's letter dated 2 August 2005, as this letter was received by them only after expiry of the said time limit for filing the appeal. The appeal of the opponent is therefore not admissible (Article 108 EPC). The opponent is thus party to this appeal proceedings as of right, pursuant to Article 107 EPC, second sentence, and will in the following be referred to as the respondent.

2. *Amendments (first auxiliary request)*

Claim 1 of the first auxiliary request is based on a combination of claims 1 and 2 as granted (claims 1 and 2 and the description, page 5, lines 31 to 37, as originally filed and published as WO-A-94/17892). The scope of protection conferred by the claims has not been extended by this amendment.

The requirements of Article 123(2) and (3) EPC are thus met.

3. *Novelty (first auxiliary request)*

3.1 *Claim feature analysis*

The features of claim 1 will in the discussion below be referred to as follows:

- (a) A method of displacing carboxylic acid-containing mother liquor comprising
 - (a1) acetic acid or water from
 - (a2) a solids material in the form of terephthalic acid crystals which are slurried in said mother liquor, said method comprising:
 - (b) forming the solids material into a layer on a movable filter medium (100);
 - (c) transporting the layer by means of the filter medium
 - (d) through a washing zone (Z2) in which the layer is contacted along the path of movement thereof with a wash medium,
 - (e) the wash medium serving to displace mother liquor from the layer and passing through the filter medium (100);
 - (f1) establishing over said layer an inert gaseous atmosphere from which inert gas passes through the layer;
 - (f2) supplying inert gas to the gaseous atmosphere
 - (g) so as to produce a concentration gradient within the gaseous atmosphere such that the mother liquor content of the gas passing through said layer increases in a direction counter-current to the direction of travel of said layer,
 - (h1) wherein said concentration gradient is produced by effecting flow of said gas in countercurrent

relation with the direction of travel of the layer of solids material whereby liquor evaporating from the layer of solids material in said zone (Z2) and upstream of said zone is substantially prevented from passing downstream of said zone."

3.2 According to decision T 0116/02 (Reasons, point 2, last paragraph), it was *"beyond reasonable doubt that the operation of the Pannevis belt filter for the production of isophthalic acid at the Sisas premises, and at least its potential use for the preparation of terephthalic acid, was publicly known before the priority date of the patent in suit."* It follows from this statement that the board considered a process for the filtration and purification of TPA consisting of above claim features (a) through (f2) in combination to be in the public domain.

3.3 Additional evidence became available after decision T 0116/02 was taken. In particular, the testimonies of witnesses Messrs. Codignola and Cugnasca, the second declaration of Dr Aird (D37) and the declaration D38, were submitted. The witnesses stated differently on the question of whether TPA was produced on a Pannevis filter at SISAS before the priority date of the opposed patent (see points 3.8.1 and 3.8.2 below). In this respect attention is however drawn to T 0116/02 (see Reasons, point 2, penultimate paragraph) stating : *"even if Sisas had not produced TPA before, at least since the visit of Aird they were aware that their belt filter **could be used** for that purpose"* (emphasis added).

3.4 What remained open in T 0116/02 (see Reasons, point 4) is whether or not above defined claim features (g) (relating to the counter-current concentration gradient) and (h1) (relating to the said concentration gradient being produced by effecting flow of said gas in counter-current relation with the direction of travel of the layer of solids material), for instance by introducing nitrogen at the downstream end of the belt, were made public. *Inter alia* on this issue the witnesses were subsequently heard by the opposition division.

3.5 The casing of the Pannevis belt filter delivered to and operated by SISAS offered two inert gas inlet ports, indicated by the dotted lines entering near the water inlets (3) and (6) in D6; drawing D16 seems to disclose the two inert gas entry points designated as N13 and N14. It cannot be deduced from these drawings which entry point was actually used by SISAS in the production of IPA. Nor is it proven that a counter-current nitrogen flow was disclosed during Dr Aird's visit, let alone in connection with a process for the filtration of TPA (see D37, point 5(ii)).

3.6 In the submission of appellant I, a counter-current concentration gradient as per claim feature (g) was not established during operation at the SISAS plant, for two reasons:

- i) According to the information given to Dr Aird (D37), the inert gas entry point used by SISAS was located at a position upstream the belt, approximately 1/3 from the feed end of the belt filter's casing; any possible gas flow was

therefore predominantly co-current rather than counter-current.

ii) The inert gas (nitrogen) atmosphere in the casing of the Pannevis filter as operated by SISAS was saturated with acetic acid due to the use of liquid sealed circulation pumps using acetic acid as a sealing liquid. Because of the inert gas atmosphere being saturated, it could not take up more acetic acid vapours at the acetic acid washing step upstream the belt filter so as to develop a concentration gradient.

3.7 The opponent (respondent; see point 1.5, last sentence) argued that the gaseous atmosphere within the belt filter casing comprised not only nitrogen, but also water vapour, acetic acid vapour, unreacted reagents and other contaminants. The mother liquor also contained these components. The concentration of these components was automatically greater in the region of the belt filter where the slurry was introduced and the acetic acid wash was carried out, than in the region where the cake was finally washed with water. Also, the highest nitrogen flow through the cake occurred in the region where the cake was almost dry (most of the mother liquid has been sucked away), whereby this gas automatically had a lower load of acetic acid vapours. For these reasons, the concentration gradient as per claim feature (g) established itself during normal operation of the plant.

As regards claim feature (h1), according to D25 (point 6) and D26 (point 6) such counter-current gas flow was also applied in the SISAS installation.

3.8 With respect to the said questions of inert gas feed point and inert gas saturation, the board considered the testimonies of the witnesses Messrs. Cugnasca and Codignola, the declarations D36 and D37 of Dr Aird (who visited the SISAS plant and discussed the installation) as well as the declarations D25, D26, D38 and D41 (D41a). This material is, in the board's view, in essential points contradictory, for the following reasons:

3.8.1 Witness Codignola stated that nitrogen (as an inert blanketing gas) was introduced into the housing of the Pannevis vacuum belt filter at one point on the right hand side of drawing D6, and that the nitrogen flowed in a direction counter-current to the belt's travelling direction (see transcript page 2, reply 7). This is in line with his earlier written declaration D26 (point 6). The witness also stated that TPA was filtered twice at SISAS on the belt filter in the years 1980, 1981 or 1982 (transcript page 1, replies 4 and 5). This cannot, however, be correct, as the Pannevis belt filter RT was only delivered in 1987 (a fact proven by the invoices D12 to D14 and confirmed by witness Cugnasca (page 7, reply 2)). These circumstances cast doubt on the validity of the statements made by the witness.

3.8.2 Witness Cugnasca stated that the nitrogen gas flowed neither in a co-current nor in a counter-current direction, with respect to the belt's direction of travelling, but was simply "*sucked down*". See transcript, page 8, reply 9. This testimony is in divergence to Mr Cugnasca's own earlier declaration D25, point 6. It is therefore questionable whether it can be

relied on. Mr Cugnasca also testified (*l.c.*) that the declaration D25 (and Mr Codignola's declaration D26 of identical wording) were drafted by Pannevis and presented to them ready for signature. Mr Cugnasca stated that at this time he did not understand the importance of the issue (*i.e.*, regarding the nitrogen flow direction), as it had no technical meaning for him (see transcript page 7, reply 2). This casts doubts on the veracity of D25.

Moreover, the witness testified that the Pannevis belt filter had not been operated for TPA production (page 7, reply 2).

Questioned on the entry point of the nitrogen, the witness was uncertain. See transcript, page 8, reply 2. The witness furthermore stated that the gas fed in from the top of the belt was "*probably saturated*" or "*presumably saturated ... with acetic acid*" (see transcript, page 9, reply 1; page 7, last reply). However, this witness declared that the concentration of acetic acid was higher at point 3 (upstream) than at point 6 (downstream), such that a gradient was established (transcript, page 7, reply 4). As discussed below, it is implausible that a concentration gradient could have developed in an atmosphere "*presumably saturated ... with acetic acid*".

According to both Mr Codignola and Mr Cugnasca, the nitrogen was introduced into the belt filter casing for safety purposes, to avoid any risk of explosion.

- 3.8.3 Dr Aird declared, based on his visit report at SISAS, that he had recorded no mention of counter-current gas flow (D37, point 5 (ii)). The re-injection point of nitrogen gas to the filter casing had been approximately 1/3 of the way along the casing from the feed end (see D36, point 4; D37, points 6.1 and 6.7).
- 3.8.4 Dr Ravizza declared (see D39, points 3 and 4) that during Dr Aird's visit the production of both IPA and TPA on a Pannevis belt filter was openly discussed and *"counter-current filter layout and operation was discussed in detail"*, but he did not mention counter-current inert gas flow or mother liquor concentration gradients.
- 3.8.5 Mr Turner, an ICI employee who attended an open day at the Pannevis premises in January 1990, declared to have no record or re-collection of any mention of a counter-current gas flow in the Pannevis belt filter proposed for IPA purification at that open day (D38, point 3).
- 3.8.6 Mr Kuhlen asserted a number of process details which were allegedly implemented at SISAS, including a *"gradient of acid concentration inside the filter housing"*, a *"counter current gas flow"* and a *"splitting up of the return gas"* into two different streams and its returning to the filter via two nozzles (D41a, point 2.5; D41, points 9, 11 and 12). The board observes that the disclosure of the said concentration gradient was not confirmed by Mr Cugnasca and disputed by Dr Aird. The other assertions are also not confirmed by the witnesses (according to Mr Cugnasca's testimony, the nitrogen gas streams were operated interchangeably (transcript, page 6, reply 3)). A split stream mode of

operation is also not unambiguously derivable from documents D6 or D16.

3.8.7 Mr Prinssen, President of Pannevis B.V., confirmed in his declaration D40 the sale and installation of a Pannevis belt filter to SISAS in 1987. However, there is no mention in his declaration that any information regarding a possible gradient of acid concentration inside the filter housing or a counter current gas flow had been made public at the occasion of a presentation held on the Pannevis premises in Utrecht in January 1990.

3.9 The board concludes from these testimonies and declarations that it cannot be established with certainty what was shown or discussed during Dr Aird's visit at SISAS about the position of the entry of inert gas (nitrogen) into the casing of the belt filter and about the direction the inert gas flowed. There is no agreement on whether port #3 or #6 was used, or whether the two entry ports were used interchangeably, with either the right or left hand side pump as shown in D6 in operation. A counter-current acetic acid concentration gradient caused by a counter-current inert gas flow within the casing is not proven to have been made public, either, in view of witness Cugnasca's conflicting statements that such a gradient existed and at the same time that the gas fed in from the top of the belt was "*probably saturated*" or "*presumably saturated ... with acetic acid*". Moreover, it was undisputed that the nitrogen circulation pumps at SISAS were operated using acetic acid as a sealing liquid (see testimony of Mr Codignola (transcript, page 2, reply 7) and Mr Cugnasca (transcript, page 6, reply 2)).

Appellant I argued that this led to a saturation of the recycled nitrogen gas with acetic acid (as confirmed by witness Cugnasca). This argument was not convincingly refuted. The nitrogen gas could therefore not pick up more acetic acid vapours at the acetic acid washing step so as to develop a concentration gradient.

It is also significant that according to the testimonies SISAS used nitrogen as an inert gas for the sole purpose of explosion prevention. Apparently, the re-circulated inert gas was never associated with a possible contamination of the product.

The opposition division argued in the contested decision that claim feature (g) was implicitly fulfilled due to the employment of a counter-current washing process, irrespective of any nitrogen flow in the gaseous atmosphere above the belt. However, this finding was based on certain assumptions concerning the distance of the washing water spray above the moving filter belt and the time necessary to reach an equilibrium between the phases. Said assumptions are unproven and were contested by appellant I. They do not take into account the possibility of saturation of the recycled nitrogen with acetic acid vapours. The board cannot, therefore, accept these arguments.

- 3.10 As a rule, the onus of the proof lies on the party asserting a fact. The respondent has not discharged this duty. The board therefore holds that a concentration gradient within the gaseous atmosphere such that the mother liquor content of the inert gas passing through said layer increases in a direction counter-current to the direction of travel of said

layer, wherein said concentration gradient is produced by effecting flow of said gas in counter-current relation with the direction of travel of the layer of solids material has not been made available to the public. Even assuming - for argument's sake - that a counter-current inert gas flow and mother liquor concentration gradient were implemented occasionally inside the vacuum belt filter casing, there is no proof that such process features have been made public during Dr Aird's visit, let alone in connection with the filtration of TPA.

- 3.11 The subject-matter of the claims is therefore novel. The requirements of Article 54(1)(2) EPC are met.

4. *Inventive step (first auxiliary request)*

- 4.1 The patent in suit relates to a method for filtration of terephthalic acid crystals slurried in a carboxylic acid-containing mother liquor on a moveable filter medium.

According to the description it was found that terephthalic acid crystals exhibit a propensity to take up acetic acid from the surrounding inert gas used in the vacuum belt filtration process, such as nitrogen, which contains acetic acid vapours. This leads to a high residual acetic acid content of the TPA filtration product despite being subjected to extensive washing with water (see patent in suit, paragraphs [0007] and [0044] to [0046]).

4.2 *The closest prior art*

First, the most suitable starting point for evaluating inventive step has to be determined.

In the present case the board identified as closest prior art the method of filtration of terephthalic acid on a vacuum belt filter supplied by Pannevis and operated by SISAS, as made public during Dr Aird's visit at SISAS (*cf.* decision T 0116/02, Reasons, point 2, last paragraph).

4.3 *The technical problem*

Both appellant I and the respondent argued that the claimed process addressed the problem of TPA re-contamination by acetic acid during the filtration on a belt filter.

Accordingly, the board considers that the technical problem underlying the patent in suit consists in providing a method of filtering TPA crystals from their mother liquor, said filtering method yielding a high purity of the product.

4.4 *The solution*

As a solution to this problem, the patent in suit now proposes a method as defined in claim 1 according to the first auxiliary request, characterized by establishing a concentration gradient within the gaseous atmosphere such that the mother liquor content of the gas passing through said layer increases in a direction counter-current to the direction of travel of

said layer, wherein said concentration gradient is produced by effecting flow of said gas in counter-current relation with the direction of travel of the layer of solids material whereby liquor evaporating from the layer of solids material in said zone (Z2) and upstream of said zone is substantially prevented from passing downstream of said zone.

4.5 *Success of the solution*

It has not been contested that the above stated technical problem is solved by the claimed process.

4.6 *Obviousness*

It remains to be decided whether the claimed technical solution is obvious or not.

- 4.6.1 For the board, there is no evidence that the unwanted phenomenon of contamination of isophthalic acid (IPA) or TPA by acetic acid picked up from the circulating inert gas had ever been addressed publicly by SISAS, Pannevis or ICI, let alone during Dr Aird's visit. Therefore, the skilled person who was in possession, before the priority date of the opposed patent, of the concept of a method for filtering TPA from mother liquor on a vacuum belt filter installation such as used by SISAS, was in no way motivated to establish a concentration gradient as defined in claim 1 of the opposed patent, by effecting flow of an inert gas in counter-current relation with the direction of filter belt travel, in order to solve the problem posed. To achieve a higher purity of the TPA product, the skilled person would have primarily considered washing the

product more thoroughly, for instance by adding a further washing step.

- 4.6.2 Appellant I argued that the effect of re-contamination of the filter cake was not known in the art. In their IPA filtration method, SISAS had not paid attention to the acetic acid contained in the nitrogen gas loop, as they were unaware of the possibility of the acetic acid being taken up by the filter cake. Consequently, there had been no motivation for modifications of their process at all. Reference was made in this respect to Dr Aird's declarations (D36, point 7; D37, points 6.1 and 7).
- 4.6.3 The respondent argued that the skilled person facing the problem of obtaining a pure product of the much larger TPA crystals and knowing that the Pannevis filter supplied to SISAS had two introduction points for nitrogen, one downstream of the other, would ensure firstly that the atmosphere was as clean as possible, and secondly that the downstream gas stream was cleaner, *i.e.* had a lower acetic acid concentration than the stream re-introduced upstream, so that the larger, already washed TPA crystals would not be re-contaminated with acetic acid just before leaving the filter belt.

In the board's opinion, the respondent's arguments are untenable, because SISAS were not aware of a possible re-contamination of the IPA by airborne acetic acid in their process. This may be concluded from the fact that the re-circulated inert gas was deliberately brought into contact with acetic acid in the recirculation pump, thereby gradually saturating it with acetic acid,

as testified by Mr Codignola (transcript, page 2, reply 7) and Mr Cugnasca (transcript, page 6, reply 2).

4.6.4 Mr Kuhlen (a former Pannevis process and sales engineer) asserted in his declarations D41 and D41a *inter alia* that the problem of re-contamination of a washed filter cake via a recycled, dirty gas phase was well known before 1993, and was not limited to IPA or TPA. Pannevis had therefore taken this phenomenon into account in the SISAS installation by splitting up the return gas stream and returning them to the filter to two nozzles, one in a more upstream and one in a more downstream position. The gas phase sucked from the filter was cooled down to reduce moisture and acid before returning to the filter.

The assertion by Mr Kuhlen that the re-contamination problem was generally known before the priority date of the opposed patent is however not corroborated by additional evidence and was contested by appellant I (D36, point 6; D37, point 2.5 and 6.4). It is also not clear from Mr Kuhlen's declaration whether the process features he referred to were actually implemented at SISAS or whether he considered them merely as "*part of general filtration know how*" (*cf.* page 1, paragraph 3), a point which had been contested by appellant I. In any event, there is no evidence that such general filtration know-how was ever applied to the filtration of TPA on a belt filter nor that it was discussed during Dr Aird's visit at SISAS. Mr Kuhlen's assertion thus cannot be accepted by the board.

The arguments regarding the above mentioned technical measures allegedly put into operation by Pannevis in

their belt filter design and allegedly implemented at SISAS have already been refuted in the preceding paragraphs. As noted before, nitrogen was used at SISAS as an inert gas for the sole purpose of explosion prevention and the re-circulated inert gas was never associated with a possible contamination of their IPA product. Still less is there a proof that anything like that had been made public during Dr Aird's visit regarding a possible contamination of TPA.

4.6.5 Finally, the respondent put forward arguments which were based mainly on declaration D41 (D41a) and concerned the differences in particle sizes between IPA and TPA, the corresponding different requirements in the amount of washing water and different absorption rates of acetic acid. Further according to D41 (point 18), IPA had been known to exhibit a greater propensity than TPA to pick up airborne impurities, such as acetic acid. The board is not convinced that all of this information was known to SISAS, because it would then have been even more obvious to take appropriate counter-measures against acetic acid pick-up in the SISAS process. However, fact is that the SISAS process relied on three counter-current washing steps to ensure product purity; re-contamination by acetic acid from recycled inert gas was never taken into account. Even less so is there convincing evidence that this information was made available to the public. Therefore, these arguments of the respondent cannot be accepted by the board, either.

4.7 A method as claimed in claim 1 of the set of claims filed as first auxiliary request is therefore based on an inventive step (Article 56 EPC).

- 4.8 Claims 2 to 18 concern preferred embodiments of the subject matter of claim 1, from which they depend. They derive their patentability from said claim 1.
- 4.9 The main request was withdrawn. As the first auxiliary request can be allowed, there is no need to deal with the subordinate requests.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the set of claims 1 to 18 according to the first auxiliary request filed with letter of 2 November 2005, the figures 1 and 2 of the patent as granted, and a description to be adapted.

The Registrar

The Chairman

C. Vodz

G. Raths