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**D E C I S I O N**  
**of 29 January 2002**

**Case Number:** T 0014/98 - 3.3.6

**Application Number:** 94904044.8

**Publication Number:** 0677124

**IPC:** D21C 9/10

**Language of the proceedings:** EN

**Title of invention:**

Process in association with pulp bleaching

**Patentee:**

Kvaerner Pulping AB

**Opponent:**

- (I) ANDRITZ AG  
(II) Eka Chemicals AB  
(III) Metso Paper Sundsvall AB  
(IV) Andritz-Ahlstrom Oy

**Headword:**

Pulp bleaching/KVAERNER

**Relevant legal provisions:**

EPC Art. 54, 56, 123(2)

**Keyword:**

"Main request: Novelty - yes (combination of features not disclosed in the prior art), inventive step - no (no prejudice in the art during the relevant time period between publication date of closest prior art and priority date of patent in suit)"

"Auxiliary requests I and III: Inventive step - no (no contribution to the closest prior art)"

"Auxiliary requests II and IV to VI: Extension beyond content of application as filed - yes"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0014/98 - 3.3.6

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.6**  
**of 29 January 2002**

**Appellant:** Kvaerner Pulping AB  
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**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted 12 November 1997  
revoking European patent No. 0 677 124 pursuant  
to Article 102(1) EPC.**

**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** G. Dischinger-Höppler  
M. Tardo-Dino

## Summary of Facts and Submissions

- I. This appeal is from the decision of the Opposition Division revoking European patent No. 0 677 124 for lack of inventive step. The decision was based on the claims as granted as a main request and on amended claims according to seven auxiliary requests.
- II. Four notices of opposition, based on insufficient disclosure (Articles 100(b) and 83 EPC) and lack of novelty and inventive step (Articles 100(a), 54 and 56 EPC), cited inter alia the following documents:
- (1) EP-A-0 402 335;
  - (2) Lachenal s. et al., "the potential of H<sub>2</sub>O<sub>2</sub> as delignifying and bleaching agent. Application to new bleaching sequences", 1992 Pan Pacific Pulp and Paper Conference Proceedings, Tokyo, 8-10 September 1992, pages 33 to 38;
  - (3) Igerud L., "Mill experiences of Lignox bleaching", the ninth Sunds Defibrator Technical Seminar, Williamsburg, USA, November 9, 1992, pages 1 to 12;
  - (4) Fredström C. et al., "Current state-of-the-art of EO, EP and EPO technologies", Non Chlorine Bleaching Conference, Hilton Head, USA, March 1992, pages 1 to 6, Figures 2 to 21;
  - (6) Basta J. et al., "Lignox on hardwood pulps", Proceedings of the 1991 Tappi Pulping Conference, Book 1, pages 153 to 158; and

- (9) Alfthan C.-J. et al., "High-temperature peroxide bleaching of sulphate pulp", svensk papperstidning, nr 15, 1977, pages 480 to 482.

The Proprietor (Appellant) in return cited amongst others the following documents:

- (E3) Roy B. P. et al., "High temperature alkaline peroxide bleaching of kraft pulps", 1995 Pulping Conference, Tappi Proceedings, Book 2, pages 771 to 778; and

- (E7) Germgård U. et al., "OZP-bleaching of kraft pulps to full brightness", International Non-Chlorine Bleaching Conference, March 1994, pages 53 to 58.

III. In its decision, the Opposition Division found that the claimed subject-matter met the requirements of Article 83 EPC. It further found that the claimed subject-matter was novel in view of the so-called Lignox process disclosed in document (1) due to the features relating to the geometry and dimensions of the bleaching vessel to be used. In respect of inventive step, it was held that no prejudice existed in the art preventing a skilled person to apply, with the additional teaching of document (2), the process of document (1) under mill scale conditions. Concerning the auxiliary requests, the Opposition Division found that the additional features contained therein did not impart inventiveness to Claim 1 of the main request.

IV. During the appeal proceedings, the Appellant filed several amended sets of claims in new requests and submitted further evidence, inter alia:

- (E16) Aitken K.G., "Peroxide Bleaching of Sulphate Pulp, Laboratory Developments Related to Mill Application", Pulp and Paper Magazine of Canada, May 1954, pages 125 to 130;
- (E17) Mlakar C. et al., "Peroxide in the Semibleaching of Kraft Pulp", Paper och Trä, No. 11, 1968, pages 629 to 638;
- (E18) US-A-4 410 397;
- (E19) Süss H. U. et al., "Chlorfreie Erzeugung von Kraftzellstoff - möglich oder unmöglich?", Wochenblatt für Papierfabrikation 23/24, 1991, pages 946 to 950; and
- (E24) Diagram representing ISO brightness versus Kappa number of the examples according to Tables II and III of the patent in suit.

V. Oral proceedings were held before the Appeal Board on 29 January 2002, in the unnotified absence of Respondent II (Opponent II) despite having been duly summoned. In the course of these proceedings the Appellant filed further amended claims in a new main request (referred to as # 10) and six auxiliary requests (referred to as # 11 to # 16).

Claim 1 of the main request (# 10) reads:

"1. Process for chlorine-free bleaching of chemical pulp in association with the production thereof, where a suspension of pulp has a concentration exceeding 8% of cellulose-containing fibre material, where pulp entering into a bleaching line is fed continuously

through at least one bleaching vessel in the bleaching line, is treated with at least one acid for adjusting the pH to a value below 7, and with a chelating agent, and is thereafter bleached in at least one stage to a brightness exceeding 80% ISO, with hydrogen peroxide or a corresponding quantity of another peroxide, employed in a quantity exceeding 5 kg/BDMT, characterized in that the peroxide bleaching is effected at a temperature exceeding 90°C and at an applied pressure in the bleaching vessel which exceeds 2 bar and in that the cross-sectional area of the bleaching vessel exceeds 3 m<sup>2</sup>, and in that the area of the metal surface exposed towards the interior of the bleaching vessel is less than 4V m<sup>2</sup>, where V indicates the volume of the vessel in m<sup>3</sup>."

Claim 1 of the first auxiliary request (# 11) differs therefrom only by inserting "**which pulp has been oxygen delignified,**" between "...where a pulp entering into a bleaching line" and "is fed continuously...".

Claim 1 of the second auxiliary request (# 12) contains in addition the following feature added at the very end of Claim 1 of the first auxiliary:

**"and in that said oxygen-delignified pulp has been delignified at least down to a kappa number of 12.1 for softwood pulps and 7.2 for hardwood pulps prior to entering said bleaching vessel".**

Claim 1 of the third auxiliary request (# 13) differs from that of the main request by replacing "exceeding 90°C" by "**exceeding 100°C**".

Claim 1 of the fourth auxiliary request (# 14) differs



from that of # 13 essentially by a "**brightness exceeding 85% ISO**" instead of 80% ISO, and the addition of the following features between "which exceeds 2 bar," and "and in that the cross-sectional ....":  
**"and the quantity of peroxide employed exceeds 10 kg/BDMT and is less than 35 kg/BDMT and wherein a pH-elevating agent is first added to the pulp before the peroxide is mixed in, and the positive pressure in the bleaching vessel is obtained with the aid of a centrifugal pump, a so-called MC pump,".**

Claims 1 of the fifth and sixth auxiliary request (## 15 and 16) contain in addition to that of the fourth auxiliary request features concerning the manganese content and a maximum temperature for adding the pH-elevating agent.

VI. Concerning the merits of the case, the Appellant orally and in writing submitted in essence

- that novelty of the claimed subject-matter in view of document (1) was not only due to the dimensional features defined by the cross-sectional area and the surface to volume ratio but also to the combination of temperature and pressure at which the peroxide bleaching was effected in order to give a brightness of at least 80% ISO;
- that the problem to be solved was to improve a bleaching stage in a bleaching sequence and that it was evident from the examples given in the patent in suit and the corresponding diagram represented in (E24) that this problem was in fact

surprisingly solved by the claimed combination of features in view of document (1) as the closest prior art;

- that document (2) led away from the proposed solution so that a person skilled in the art would not combine it with the teaching of document (1); and
- that plenty of evidence showed that there existed a prejudice in the art against the performance of a peroxide bleaching step at temperatures above 90°C since it was expected by those skilled in the art that peroxide decomposes and viscosity and brightness of the pulp suffer at higher temperatures.

VII. The Respondents objected to the amendments made to the claims of all new requests under Articles 84 and 123(2) EPC and maintained that the subject-matter of Claim 1 of the main request lacked novelty in view of document (1). Concerning inventive step they essentially presented the following arguments:

- The experimental data given in the patent in suit did not represent the claimed subject-matter and could not, therefore, be used as evidence for the solution of a particular problem.
- As was apparent from documents (2) to (4), the Lignox process of document (1) was discussed in the art in combination with high pressure and temperature conditions and mill scale application.
- The problem actually solved in view of this prior

art consisted in an optimization of the Lignox process conditions.

- The solution suggested in the patent in suit which consisted in an adjustment of the conditions to high process temperatures in a full scale bleaching vessel was, however, obvious in the light of the disclosure of document (2).
- The alleged prejudice was non-existent in the art but instead self-created by the Appellant by its own internal lab tests.

VIII. The Appellant requests that the decision of the Opposition Division be set aside and that the patent be maintained in amended form according to one of the new main and auxiliary requests filed with its statement of grounds of appeal and with a letter dated 14 September 2000.

The Respondents request that the appeal be dismissed.

## **Reasons for the Decision**

### *Main Request*

The Board is satisfied that the claims of the main request comply with the requirements of Articles 84 and 123 EPC, as well as with that of Article 54 EPC. It is not necessary to give further details since the request fails for other reasons. However, it is appropriate to comment on a specific issue in Claim 1 which was differently assessed by the parties but has a particular bearing on the interpretation of the claim.

1. *Amendments*

The issue concerns the replacement in Claim 1 of the term "at a pressure" by "at an applied pressure".

- 1.1 The Respondents argued that this term was either redundant (Article 84 EPC) if meaning the pressure which is automatically present at the bottom of a huge bleaching tower for hydrostatic reasons or necessary for avoiding boiling of the pulp in order to achieve temperatures of about 100°C and above, or not originally disclosed in accordance with Article 123(2) EPC if having any other meaning.
- 1.2 The examples given in Tables I to III of the patent in suit have been carried out under laboratory scale conditions at temperatures of 90°C, 100°C and 110°C and at a pressure of either 0 bar or 5 bar. It is, therefore, apparent that the pressure given in the examples of the patent in suit as 5 bar and indicated as "average pressure (excess)" (see Tables I to III) is an overpressure applied in excess to the atmospheric pressure (0 bar gauge). This is corroborated in various parts of the application as originally filed where mention is made of a pressurized P or (PO) stage in comparison with conventional technology under atmospheric pressure (see in particular pages 13 and 14 of the original version of the application filed under International Application Number WO-A-94/29511). These findings may, in the Board's opinion, be transferred to the other parts of the patent in suit too with the result that any applied pressure or positive pressure mentioned therein has to be understood as an overpressure.

In addition, the parties agreed that in order to be able to work at a bleaching temperature of 130°C, an overpressure of about 1.7 bar (total pressure of 2.7 bar) has to be applied. It follows that the examples in the patent in suit have been conducted at a pressure clearly above that pressure which is necessary to avoid boiling of the pulp and also clearly above any hydrostatic pressure built up in the lab scale vessel itself.

- 1.3 The Board further does not accept the Respondents' argument that any application of pressure was originally disclosed only in relation to oxygen since it is also mentioned in the description that nitrogen can be employed instead (original application, page 4, lines 32 to 33) and even that the peroxide stage be carried out hydraulically, with no gas phase at all (original application, page 6 lines 24 to 27).

2. *Novelty*

- 2.1 Novelty has been contested only in view of document (1). The Respondents, however, did not dispute the following facts:

- that document (1) did not mention any pressure at all;
- that document (1) did not mention any particular dimensions of the bleaching vessel; and
- that the highest value for a temperature in document (1) is given as 130°C.

- 2.2 It follows from point 1.2 above that an overpressure of

1.7 bar is sufficient for a bleaching temperature of 130°C. Further nothing in document (1) suggests that the bleaching vessel must be such that during the peroxide bleaching stage a pressure is hydrostatically built up so that, in total, an overpressure of more than two bar results as required by Claim 1.

- 2.3 The Board has not overlooked and appreciates that the process of document (1) is intended for use under mill scale conditions (see e.g. page 3, lines 15 to 19). However, these conditions are not indicated, let alone disclosed clearly and unambiguously, neither as such nor in combination with all the other features of Claim 1. Thus, the bleaching process of document (1) has not to be chlorine-free in all instances (Claim 10, page 4, lines 33 to 38 and Example 7). In addition, the claimed process parameters like pulp consistency and temperature must be selected from the different ranges disclosed in document (1) where the consistency may vary from 1 to 40%, preferably from 5 to 15% (page 4, lines 9 to 10) and the temperature in the peroxide bleaching stage may vary from 50 to 130°C, preferably 80 to 100°C (page 4, lines 8 to 9).

It follows that a process with all the parameters given in Claim 1 of the main request was not made available to the public by document (1). With respect to the other citations, it is sufficient to state that they do not disclose the claimed process either, which process is, therefore, novel.

### 3. *Inventive step*

#### 3.1 Technical background

The patent in suit relates to the general problem of eliminating the use of chlorine-containing compounds for bleaching purposes and, in particular to the chlorine-free bleaching of chemical pulp using hydrogen peroxide or another peroxide as the bleaching agent (page 2, lines 3 to 8).

According to the patent in suit, processes are known which combine an EDTA treatment (Q stage) and a peroxide bleaching step (P stage) but it is said that these processes, which are of the Lignox and Macrox type, present the disadvantage that half the added peroxide remains unused (page 2, lines 12 to 16). Document (1) is particularly referred to as describing the Lignox process and it is stated that this document includes the suggestion to raise temperature and apply pressure in order to achieve optimal utilization of the hydrogen peroxide employed. The patent specification states that experiments in this direction have failed in all respects (page 2, lines 25 to 31).

### 3.2 Closest prior art

3.2.1 Nevertheless, all parties rely on this document as the closest prior art and also the Board agrees that document (1) qualifies as a suitable starting point for assessing inventive step since it is also concerned with the problem of using bleaching agents which are poor in or free from chlorine-containing compounds (page 2, lines 14 to 19 and page 4, lines 2 to 5). It further mentions low hydrogen peroxide consumption as being one aim in peroxide bleaching processes (page 5, lines 10 to 14).

3.2.2 Thus, document (1) discloses a process for bleaching

chemically delignified pulp by first treating the pulp in a Q stage with a complexing agent (= chelating agent) such as EDTA or DTPA at a pH of preferably 6 to 7 and thereafter in a second step with a peroxide-containing substance at a temperature of 50 to 130°C, preferably 80 to 100°C (see Claims 1, 5, 8, and 11 and page 4, lines 8 to 9). A total chlorine-free (TCF) variant of this process is described in Example 8 where oxygen delignified sulphate pulps of softwood and hardwood and a sulphite pulp have been treated with EDTA in a Q stage at a pH of below 7 and thereafter with hydrogen peroxide at a temperature of 90°C for the sulphate pulps or, respectively at 80°C for the sulphite pulp. As can be seen from Tables X and XI, a brightness of above 80% ISO is obtained with a quantity of hydrogen peroxide exceeding 5 kg/BDMT.

3.2.3 In document (1), the pulp concentration is preferably selected from between 5 to 15% (page 4, lines 9 to 10), thus covering values below the claimed concentration of above 8%. Moreover, document (1) does not explicitly mention an acid treatment for adjusting the pH or that the pulp is fed continuously through the bleaching line. However, no evidence is on file which would allow any unbiased distinction over the prior art or show any contribution to inventiveness based on these features. Nor did the Appellant rely thereon as essential to demonstrate inventiveness of the claimed process over that of document (1). Therefore, it is neither possible nor necessary to consider further these features of the process of Claim 1 when investigating inventive step.

### 3.3 Technical problem and its solution

3.3.1 According to the patent in suit, the object consisted



in providing a process of the type mentioned in the introduction, i.e. the Lignox type, which provides efficient and more homogenous bleaching (page 2, lines 37 to 38 in combination with lines 12 and 28).

- 3.3.2 The homogeneity of the bleaching cannot be taken into account since no evidence is on file in this respect. As regards efficiency of the bleaching, this implies, according to the Appellant's written and oral submissions that high brightness is achieved in a bleaching stage under economic use of peroxide without appreciable loss of viscosity or other detrimental effects on the pulp.
- 3.3.3 The Appellant submitted that this technical problem was surprisingly solved by the claimed process. It argued that this could be seen from a comparison of Example a in Table I representing the process of document (1) with Examples c and f in Table I which simulated the last feature of Claim 1 aiming at a small internal metal surface in  $m^2$  of the bleaching vessel in relation to the volume of the vessel expressed in  $m^3$ , and with Example f in Table II showing the influence of temperature. The surprising effect could also be seen from the diagram (E24) which illustrated the improved brightness versus kappa number of the examples according to the invention represented in Table II in comparison with those of the comparative experiments in Table III.
- 3.3.4 However, as admitted by the Appellant, all examples given in the patent in suit have been made under laboratory scale conditions whilst the claimed subject-matter, in particular via the cross-sectional area of the vessel of more than  $3 m^2$ , concerns mill scale

conditions. Therefore, none of the examples in the patent in suit relates to the claimed process in this respect.

3.3.5 From the examples given in the patent in suit, only those contained in Table II fulfil the requirements of Claim 1 in respect of temperature and pressure. However, Examples f in Tables I and II merely show that higher brightness (83.1 instead of 81.6% ISO) can be obtained by increasing the temperature, however, at the expense of viscosity (790 instead of 837 dm<sup>3</sup>/kg) according to the well-known principle that a process resulting in increased brightness brings about a decrease in viscosity and vice versa. In addition, it can be seen from Example e of Table II (brightness 81.3% ISO; viscosity 827 dm<sup>3</sup>/kg) that the effect is only present for a sufficient retention time since it is apparent that any gain in brightness and loss in viscosity by raising the temperature by 10°C is abolished if retention time is halved.

3.3.6 Concerning diagram (E24), the Board shares the opinion of the Respondents that it is not possible to compare all the data contained therein against each other. It is a general rule that in order to illustrate the influence of one particular parameter, all other parameters must be kept constant. In the Tables of the patent in suit, this principle only applies to particular combinations of examples. Thus, it can be derived from Table II that both, increasing retention time and increasing peroxide charge, increase brightness and bring about some decrease in viscosity and increase in peroxide consumption. No comparison is, however, possible between Table II and Table I wherein not only a different temperature but also a different

retention time is used. The same applies to Table III, where as compared with Table II, the NaOH charge has been changed in addition to the retention time at various pressure and temperature conditions. Therefore, the Board comes to the conclusion that no realistic conclusions can be drawn from the incomparable data contained in diagram (E24).

3.3.7 Moreover, according to the established jurisdiction of the Boards of Appeal, comparative tests intended to demonstrate an unexpected effect have to be made with prior art variants having "the closest possible structural approximation" to the subject-matter claimed (see Case Law of the Boards of Appeal of the European Patent Office, 3rd edition 1998, chapter I. D.7.7.2). Whilst, in the present case, Example a of Table I was carried out at a temperature of 90°C and can be accepted as representing an embodiment falling within the disclosure of document (1), it cannot be accepted as the closest possible approximation to the claimed process requiring a bleaching temperature of **above 90°C**, since document (1) also recommends temperatures **above 90°C** and mentions explicitly temperatures of 100°C and 130°C. Thus, the Board holds that any effect should have been demonstrated on the basis of these higher temperatures.

3.3.8 Consequently, no evidence has been provided by the Appellant which would allow the conclusion that the technical problem in view of document (1) stated above under 3.3.1 and 3.3.2 has indeed been solved by the claimed subject-matter.

Bearing in mind that both the patent in suit and document (1) aim at a chlorine-free bleaching process

using peroxide at low consumption (see 3.2.1 and 3.2.2 above), that document (1) indicates that the bleaching process disclosed therein, later-on known as the Lignox process, should be used on a bleach plant (see 2.3 above), and considering the vessel related parameters in Claim 1 of the patent in suit, i.e. the cross-sectional area of more than 3 m<sup>2</sup> and the ratio of the internal metal surface of the vessel to its volume of 4 measured in m<sup>2</sup>/m<sup>3</sup> which both stand for full scale bleaching conditions, the technical problem to be solved over document (1) can only be seen in proposing conditions suitable for realizing the Lignox process of document (1) in a mill scale bleaching vessel. Disregarding those features which do not contribute to inventive step (see 3.2.3 above), the solution proposed in Claim 1 consists in selecting a temperature of above 90°C and an overpressure of above 2 bar as the convenient process conditions. It is prima facie credible that the above stated technical problem has been solved by the claimed subject-matter. Corroboration of this finding is given in a test report dated 29 November 1995 and filed during the examination procedure which shows process conditions and results obtained in a full scale reactor.

- 3.4 It remains to be decided whether in view of the available prior art documents, it was obvious for someone skilled in the art to solve this technical problem by the means claimed.
- 3.5 Document (1) proposes bleaching temperatures in the range of 50 to 130°C, which implicitly also discloses an overpressure of up to 1.7 bar (see 2.2 above). It does not contain any hint that particular conditions are required for conducting the process on full scale.

3.6 According to the Appellant, however, the mentioning of temperatures up to 130°C in document (1) was understood by those skilled in the art merely as a speculation since there existed a profound technical prejudice against using of a temperature above 90°C in a peroxide bleaching stage. Reference was made in this respect to documents (9) and (E16) to (E18). Further, as evidence that the above prejudice in the prior art still existed even after the publication date of document (1) and up to the priority date of the patent in suit, the Appellant relied on documents (3), (4), (6), (E19), (E3) and (E7).

3.7.1 Concerning the time period **prior to the publishing of the Lignox process in document (1)** on 12 December 1990, the Board agrees that several prior art documents suggest limitation of the temperature to about 90°C for a peroxide bleaching stage (see document (9), page 480, right-hand column, lines 5 to 21; document (E16), page 128, left-hand column, section E.; and document (E17), page 634, right-hand column and page 629, summary) and that peroxide was not able to effect sufficient pulp bleaching for most papermaking requirements (see document (E18), column 2, lines 34 to 36).

3.7.2 Relevant in the present case is, however, the technical knowledge and understanding in the art **after publication of the Lignox process in document (1) and up to the priority date of the patent in suit**. Document (6) dealing with this particular process (see e.g. title) teaches that increasing temperatures from 60°C to 90°C steadily improve peroxide performance in respect of brightness and kappa number reduction. It is further stated that this increase was accompanied by

only a small drop in viscosity and that, therefore, any mention of temperatures only up to 90°C was for practical reasons only, but did not indicate a temperature optimum (page 155, left-hand column). Thus, if a skilled person was prepared to accept some further loss in viscosity, it would have also contemplated higher temperatures in a Lignox process, at the latest in 1991, the publication year of document (6). No contradiction can be found in the other documents cited by the Appellant. According to document (E19), published in the same year, oxygen and peroxide were held to be not capable of obtaining high brightness levels but of damaging the fibre (page 948, left-hand column, section 6, first paragraph). Neither this document, nor document (4) relates to the Lignox process. The latter is concerned with extraction stage technology (page 1, first paragraph). Document (3) relates to the Lignox process, but does not propose any optimum or limitation for the bleaching temperature. If 85°C was chosen for the corrosion tests in Figures 15 and 16 (page 11), the reason for that may well be a practical one as stated in document (6) (see above).

3.7.3 Documents (E3) and (E7) were published after the priority date of the patent in suit and, therefore, not relevant in respect of the existence of a prejudice at that priority date. In addition, both documents merely indicate that the maximum temperature for bleaching with peroxide used to be 90°C in the past and that thereafter higher temperatures and pressurization were applied without indicating at what time this change of technical judgment first occurred in public (see in document (E3), page 771, left-hand column, introduction, second and third paragraph; in document (E7), page 54, right-hand column, last paragraph).

3.7.4 Since, further, no evidence was submitted showing that the alleged unsuccessful experiments in respect of the Lignox process (see patent in suit, page 2, lines 25 to 31) have ever become known in the art, the Board is convinced that no prejudice against using temperatures above 90°C in Lignox bleaching process existed at the priority date of the patent in suit but instead considers document (1) as relevant in this respect.

3.8 Concerning the remaining feature of applying a pressure exceeding 2 bar, the Respondents relied on Table V of document (2) showing pressurization in excess of 2 bar and at a temperature of above 90°C during the peroxide stage of an O-Q-PO bleaching sequence.

3.8.1 In Table V of this document a bleaching sequence O<sub>1</sub>-EDTA-O<sub>2</sub>/P is shown where an unbleached pulp having a kappa number of 30.0 is "bleached" to kappa number 18.0 and brightness 31.5% ISO at a pulp viscosity of 1450 DP in an initial O<sub>1</sub>-stage, thereafter treated with EDTA in an acid Q-stage and finally treated for 1 hour with peroxide under pressurization with oxygen to 5 bar (0.5MPa) at a temperature of 100°C. The resulting pulp has a kappa number of 9.7, viscosity of 1430 DP and a brightness of 58.0% ISO. Thus, a person skilled in the art would in the Respondents' view have an incentive to work a Lignox process at increased pressure and temperature conditions.

3.8.2 The Appellant pointed out that the said Table V itself showed that the better brightness was obtained if the process was carried out at only 90°C and without any pressurization and that therefore, a skilled person would not have used the pressurized version.

3.8.3 In fact, sequence O<sub>1</sub>-EDTA-P illustrates that such conditions result in a pulp of about the same kappa number (9.8) but of higher brightness (62.2% ISO). However, in this sequence the retention time for the peroxide bleaching step was twice as long (two hours) as in the pressurized sequence and the viscosity of the pulp was considerably lower (1370 DP) (see page 36, Table V in combination with Table III). These results correspond in essence to those found in Tables I and II of the patent in suit (see 3.3.5 and 3.3.6 above) that increasing retention time increases brightness but decreases viscosity. In addition to that, document (2) states that despite the higher temperature of 100°C in the pressurized peroxide step, pulp viscosity was kept at a surprisingly good level (page 37, left-hand column, lines 10 to 16). Bearing in mind that those skilled in the art always take care to balance such diverging effects, they would, in the Board's opinion, also adopt the incentive given in document (2) and try to apply in the Lignox process of document (1) the peroxide at an overpressure exceeding two bars.

3.8.4 The Appellant further argued that Table V did not relate to a bleaching stage as did the patent in suit but to a delignification stage (page 36, left-hand column) which was technically different and distinguishable from a bleaching process. Therefore, a person skilled in the art concerned with the performance of bleaching would not have combined the delignification process described in document (2) with the process of document (1).

3.8.5 The Appellant, however, agreed that it was not possible to make a sharp distinction between the terms bleaching and delignification. As is apparent from the passage on



page 36 of document (2) cited above (point 3.8.4), the term bleaching has a twofold meaning in the art. Thus, pulp bleaching in its broader sense covers both, removal of lignin by delignification and removal of chromophores, the latter corresponding to bleaching in its narrower sense, the so-called final bleaching at the end of the total pulp bleaching process where the lignin content and the kappa number of the pulp are usually low. Therefore, depending on the stage at which the peroxide treatment was carried out within the whole bleaching sequence more lignin or more chromophores are destroyed by the peroxide, but either way accompanied by some further destruction of chromophores or, respectively some further removal of lignin.

3.8.6 Since kappa number or lignin content are not features of the claimed subject-matter, Claim 1 is not restricted to a final bleaching process. Moreover, the Examples given in the patent in suit show that even though the starting kappa number of 12.1 is relatively low (page 4, line 47) in comparison to the starting kappa number of 18.0 in document (2) it is reduced during the process to 4.0 to 5.3 (Table II) which indicates that the amount of lignin still contained in the pulp is further removed to a considerable degree. Thus, it would not be possible to distinguish the claimed process from the O<sub>1</sub>-EDTA-O<sub>2</sub>/P sequence in document (2) merely for the reason that it is called bleaching process.

4. Therefore, the Board concludes that, for the purpose of realizing the Lignox process of document (1) in a bleach plant, the skilled person, with a reasonable expectation of success would have tried the pressure and temperature condition suggested in document (2), in

particular since these conditions were recommended to result in low loss of viscosity (see 3.8.3 above). Consequently, the subject-matter of Claim 1 of the main request lacks an inventive step and does not meet the requirement of Article 56 EPC.

5. *Auxiliary Requests*

5.1 Admissibility

5.1.1 The claims of the auxiliary requests ## 12 and 14 to 16 (i.e. second and fourth to sixth auxiliary request) do not comply with the requirements of Article 123(2) EPC for the following reasons:

The feature at the end of Claim 1 of the second auxiliary request concerns the introduction of open-ended ranges for the kappa number to be obtained for softwood and hardwood pulps by oxygen delignification in advance to the bleaching process. Whilst the specific values of 12.1 and 7.2 are originally disclosed for particular instances (page 9, lines 4 to 13 and page 14, lines 24 to 30) no support exists in the original documents for the now claimed ranges of "at least down to a kappa number of 12.1 ... and 7.2".

Claim 1 of each of the fourth to sixth auxiliary request contain the introduction of the features of original Claims 4 and 9 in combination. However, Claim 9 being explicitly only dependent on Claim 3 and in the absence of any support in the description that a brightness of 85% ISO is obtained under the conditions given in Claims 4 and 9, the combination of their features amounts to added matter which extends beyond the content of the application as filed.

Auxiliary requests ## 12 and 14 to 16 must, therefore, fail.

5.1.2 In contrast, the amendments made to the claims of the first and third auxiliary request (## 11 and 13) find support in the original application as filed. The feature introduced into Claim 1 of the first auxiliary request "which pulp has been oxygen delignified" is supported by all originally disclosed examples, including those illustrated in the Figures. The feature "exceeding 100°C" in the third auxiliary request is supported by Claim 3 in combination with the examples contained in Figures 1, 2 and 8 to 11 of the original application.

5.2 However, none of these amendments is suitable to add any new aspect with regard to inventiveness to the claimed subject-matter since both of these features, the initial delignification by oxygen and the bleaching temperature of above 100°C have been suggested in the relevant prior art (see document (1), page 4, lines 8 and 36 to 42 and Claims 2, 3 and 11; document (2), page 36, right-hand column, lines 23 to 25 and Table V).

5.3 The same conclusions as drawn for Claim 1 of the main request (see 4. above) therefore applies mutatis mutandis to Claim 1 of both the first and third auxiliary request.

## **Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

G. Rauh

P. Krasa