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**D E C I S I O N**  
**of 27 June 2000**

**Case Number:** T 1026/96 - 3.3.6

**Application Number:** 89117235.5

**Publication Number:** 0383999

**IPC:** D21C 9/10

**Language of the proceedings:** EN

**Title of invention:**

Procedure for the bleaching of pulp

**Patentee:**

ENSO-GUTZEIT OY

**Opponent:**

CLARIANT INTERNATIONAL LTD.  
GENENCOR INTERNATIONAL INC.  
Novo Nordisk A/S  
Gist-brocade NV

**Headword:**

Pulp bleaching/ENSO

**Relevant legal provisions:**

EPC Art. 84, 123(2), 54(3)

**Keyword:**

"Clarity of functional feature - no (main request)"  
"Clarity, support and novelty - yes (auxiliary request)"

**Decisions cited:**

T 0068/85

**Catchword:**

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Case Number: T 1026/96 - 3.3.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.6  
of 27 June 2000

**Appellant:** ENSO-GUTZEIT OY  
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**Decision under appeal:**

Decision of the Opposition Division of the  
European Patent Office posted 13 September 1996  
revoking European patent No. 0 383 999 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** G. Dischinger-Höppler  
P. H. Mühlens

## Summary of Facts and Submissions

I. This appeal is from the decision of the Opposition Division to revoke European patent No. 0 383 999. The decision was based on an amended set of 5 claims, the only independent claim reading:

"1. Procedure of the bleaching of sulphate pulp, in which procedure an oxidating bleaching chemical containing chlorine is used, characterized in that in order to reduce the amount of toxic compounds in the wastewaters of the bleaching step and to reduce chemical oxygen demand in wastewater treatment a chemical with a chlorine dioxide content of at least 70% is used in the first oxidation stage, that the sulphate pulp is subjected to hemicellulase enzyme treatment before the oxidation, and after the oxidation and enzyme treatment, the pulp is treated with an alkali."

II. The Opposition Division held that the subject-matter of Claim 1 did not exclude an oxygen pre-treatment before the enzyme treatment and, therefore, lacked novelty in view of Example 9 of document

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which is state of the art according to Article 54(3) EPC.

III. By letter of 26 November 1999, the Board indicated its intention to confine the proceedings to this issue.

IV. During the oral proceedings held on 27 June 2000, the Appellant (Proprietor) filed a new set of five claims as an auxiliary request, Claim 1 of which differs from that of the main request by deletion of "in order to reduce the amount of toxic compounds in the wastewaters of the bleaching step and to reduce chemical oxygen demand in wastewater treatment".

V. The Appellant's arguments submitted in writing and orally can be summarized as follows:

- The functional feature contained in Claim 1 of the main request was part of the technical teaching allowing optimization of the bleaching process.
- The first step in the bleaching procedure of Example 9 of document (2), was a delignifying oxygen treatment, followed by an enzyme treatment and thereafter a conventional treating sequence using chlorine dioxide to oxidise chromophores.
- The oxygen treatment in document (2) was not an independent pretreatment, but the first oxidation stage applied in the bleaching of a pulp resulting from a kraft process (which is a synonym for sulphate pulp).
- By contrast, the first oxidation stage in the claimed process is the one using a chemical with a chlorine content of at least 70 % prior to which the pulp is treated with an enzyme.
- Consequently, according to the patent in suit the enzyme is added to a pulp having a much higher lignin content than in Example 9 of document (2).

VI. The Respondents (Opponents) supported the opinion set out in the contested decision and presented, in essence the following further arguments:

- The meaning of the term "first oxidation stage" was not clear in the context of Claim 1.
- Claim 1 defined a core sequence of bleaching steps within the whole sulphate pulp bleaching procedure without, however, excluding an oxygen pretreatment as disclosed in document (2).
- Contrary to the requirements of Article 123(2), there existed no basis in the application as originally filed for amended Claim 1 to be so interpreted that the treatment with chlorine/chlorine dioxide represented the first oxidation stage within the overall bleaching procedure.
- On the other hand, said treatment with chlorine/chlorine dioxide was the only oxidation stage mentioned in Claim 1. If this treatment should be interpreted as the "first oxidation stage" within the core sequence, this same definition applied to document (2).
- The oxygen treatment step of document (2) was either not an oxidation stage in a bleaching sequence, in which case Example 9 of document (2) anticipated the novelty of the subject-matter of Claim 1, or could be a treatment with chlorine dioxide. In the latter case, the general disclosure of document (2) was novelty destroying.

- Moreover, the general teaching of document (2) included other process modifications covering that of Claim 1 of the patent in suit.
- As a precaution the Respondents submitted that the subject-matter of Claim 1 of the patent in suit lacked an inventive step as well as lacking sufficiency of disclosure.

VII. The Appellant requested that the decision under appeal be set aside and that the case be remitted to the Opposition Division for further prosecution on the basis of Claims 1 to 5 as annexed to the decision under appeal (main request) or alternatively on the basis of Claims 1 to 5 as filed during the oral proceedings (auxiliary request).

The Respondents request that the appeal be dismissed.

## **Reasons for the Decision**

### *1. Main Request - Admissibility*

According to Article 102(3) EPC, claims modified during the Opposition Proceedings must satisfy all the requirements of the EPC, including Article 84 EPC.

- 1.1 Claim 1 of the main request differs from granted Claim 1 by specifying that the process be applied to sulphate pulp, by limiting the enzyme to hemicellulase, by defining a first oxidation stage and by introducing a functional feature defining the following technical result "**... to reduce the amount of toxic compounds in the wastewaters of the bleaching step and to reduce**

**chemical oxygen demand in wastewater treatment".**

- 1.2 Article 84 EPC requires the claims to define the matter for which protection is sought in the sense that the essential features of the invention must be contained in the independent claim as implemented by Rule 29(3) EPC.

Further, Article 84 EPC requires the claims to be clear. The latter practically means that a person skilled in the art should understand what is meant by the language of a claim. This also applies to functional features, where clarity depends on the question whether the feature provides technical instructions which are sufficiently clear for the expert to reduce them to practise without undue burden (T 68/85, OJ EPO 1987, 228, reasons No. 8.4.3). This implies that the practical meaning of a functional feature has to be assessed in the light of the general technical knowledge of those skilled in the art as well as of the whole disclosure of the patent concerned.

- 1.3 As correctly indicated by the Opposition Division, the functional feature is equivalent to the object of the invention as stated in the patent in suit (page 2, lines 36 to 38) which object is said to be achieved by the characterizing portion of granted Claim 1 (page 2, line 39). The latter is composed of three technical features, namely an oxidation stage, an enzyme treatment and an alkali treatment.

- 1.4 The Appellant argued that the functional feature in question was part of the technical teaching insofar as it helped the skilled person to optimize the process steps once he knew the purpose thereof.



However, the Appellant did not provide any evidence indicating what additional technical features a skilled person could apply according to the existing common general knowledge in order to optimize the process features of Claim 1. Nor does the patent in suit suggest any such additional instructions, except those defined in the dependent claims and those of applying the process to **sulphate** pulp, defining the **first oxidation stage** and the selection of **hemicellulase** as the enzyme to be used.

1.5 Since these latter features are included in pending Claim 1, the functional feature creates uncertainty as to whether or not the technical features of Claim 1 in fact supply a full definition of the claimed subject-matter in the sense of Article 84 and Rule 29(3) EPC, which - if not - could amount to an insufficient disclosure of the invention (Article 83 EPC), or whether the functional feature is simply redundant and should be deleted from the claim to comply with the requirement of conciseness set forth in Article 84 EPC.

1.6 It follows from the above that the functional feature renders Claim 1 either unclear or inconcise contrary to the requirement of Article 84 EPC, so that the main request has to be rejected.

## 2. *Auxiliary Request*

The Respondents raised objections to Claim 1 under Article 84 EPC and 123(2) EPC with respect to the term "first oxidation stage". They further raised objections under Article 54(3) EPC in view of document (2).

### 2.1 Admissibility and Article 84 EPC

The Respondents argued that the process steps of Claim 1 described a core sequence within the whole bleaching process. Therefore, it was not clear whether the term "first oxidation stage" referred to the whole process or only to said core sequence.

Moreover, the term "oxidation" was used in Claim 1 on different occasions, namely once in the preamble where use of an oxidating bleaching chemical containing chlorine is mentioned, and twice in the characterizing portion where a first oxidation stage is identified and where the term "oxidation" is mentioned in relation to an enzyme and alkali treatment preceding or, respectively following it. The Respondents objected that there was no indication how these different terms were interrelated.

Having regard to the fact that the only oxidation stage explicitly mentioned in Claim 1 is said to be the first one in the claimed procedure of bleaching a sulphate pulp and taking into account that process steps which are intended in the first place to delignify this pulp will also result in its bleaching, the Board finds that this first oxidation stage is the very first one in the whole working up of a sulphate pulp resulting from a kraft process. The Board, therefore, considers that the "oxidating bleaching chemical containing chlorine" mentioned in the preamble of Claim 1 is either applied in said first oxidation stage together with at least 70% chlorine dioxide and/or in a separate, later oxidation stage, which is not further specified. Therefore, the term "the oxidation" as used in connection with the enzyme and alkali treatment relates, in the Board's opinion, exclusively to said first and only intentionally mentioned oxidation stage.

Should a skilled reader of Claim 1, nevertheless, still have doubts remaining whether Claim 1 relates to the overall process of bleaching/delignifying a sulphate pulp or only a part of it (core sequence of bleaching), he would avail himself of the description of the patent in suit in accordance with Article 69 EPC. Page 2, lines 5 to 7 state:

"Especially pulp obtained from a sulphate pulping process is of brown colour, which is mainly due to the lignin remaining in the pulp. Lignin is removed from the pulp by bleaching, which is a process consisting of several stages."

And in line 36 of the same page, he would have found:

"It is the object of the invention to provide a procedure for the bleaching of pulp ... ."

This makes it clear that, in the terms of the patent in suit, "bleaching" encompasses delignification of the pulp and further that the bleaching process of Claim 1 is applied to the (crude) pulp obtained from a sulphate pulping process and, thus, means the overall process and not a part (core sequence) of it.

In the Board's considered understanding, Claim 1 therefore defines a pulp bleaching process covering a hemicellulase enzyme treatment step which is followed (not necessarily directly), firstly, by the first oxidation step of the whole process in which first oxidation step a chemical containing at least 70% chlorine dioxide is used and, secondly, by an alkali treatment step.

It follows that the subject-matter as claimed according to the auxiliary request complies with the clarity requirement of Article 84 EPC.

## 2.2 Admissibility and Articles 123 EPC

The gist of the Respondents' arguments is that, depending on the meaning given to the term "first oxidation stage", subject-matter could be introduced which extended beyond the content of the application as filed.

It is, therefore, necessary to establish whether or not the definition given above under 2.1 finds support in the application as originally filed.

- 2.2.1 The term "first oxidation" is used twice in the application as originally filed, namely in Example 1 (as stated by the Opposition Division) and, in addition, on page 3, line 2 of the application as originally filed. Whilst the Example alone does not unequivocally indicate whether or not the birch sulphate pulp before being treated with the enzyme had already been subjected to any conventional pretreatment which, possibly, includes oxidative steps, it is indisputably clear from the last paragraph on page 2 and the first paragraph on page 3 of the original application that the enzyme treatment of **the pulp as obtained from the digester** precedes any oxidative steps. This is corroborated by the statement (application as filed, page 3, second paragraph) that the bleaching process can be performed in conventional manner, **except for the enzyme treatment**. Consequently, there is a clear teaching in the application as originally filed that the enzyme treatment must be the

first process step to which the pulp is subjected without any pretreatment steps in advance to it (see also the corresponding passages in the patent in suit: page 2, lines 41 to 43, lines 49 to 50 and lines 54 to 56).

- 2.2.2 Given this disclosure, the Respondents cannot succeed with their argument that the mentioning of oxygen within the alkali treatment stages (patent, page 6, lines 10 to 14) would suggest an oxygen treatment anywhere in the whole bleaching process, including in advance of the enzyme treatment.
- 2.2.3 The above cited passages (application, page 2, last paragraph to page 3, first paragraph) further teach that after the enzyme treatment alternate oxidation and alkali treatment stages are applied in the conventional manner and that, **in the oxidation stage**, a chemical is used with a chlorine dioxide content of at least 70% (application, page 2, last paragraph). The treatment with enzymes as defined in the patent in suit, e.g. hemicellulase, is not an oxidation stage. None of the Respondents ever contested this. It follows, by implication, that there exists one first oxidation stage in the procedure, namely after the enzyme treatment.
- 2.2.4 According to Experiments 3 and 4 of Example 1, the pulp is subjected to an oxidating treatment after the enzyme treatment using a mixture of 90% chlorine dioxide and 10% chlorine gas, thereafter applying an alkali treatment and then **repeating the oxidation and alkali phases**. The same is disclosed in Example 2 with an oxidative mixture of 80% chlorine dioxide and 20% chlorine gas. None of the examples suggest using any

other chemical in the oxidation stages than those mixtures of chlorine dioxide and chlorine gas (see also Tables 1 and 2).

Consequently, the Examples use a chemical having a content of at least 70% chlorine dioxide in all of the oxidation stages in the procedure and, hence, also in the first one, thereby providing a basis for the respective amendment in Claim 1.

2.2.5 It follows that the term "first oxidation stage" does not extend beyond the content of the application as filed. It further brings about a restriction of the scope of the claims as granted. Therefore, this amendment complies with the requirements of Article 123(2) and (3) EPC.

2.3 As concerns the remaining amendments, the Board is satisfied that they also comply with the requirements of Articles 84 and 123(2)(3) EPC. This not being contested, no detailed reasoning is required.

2.4 Novelty

The only point to be decided here is whether or not the process of Claim 1 is novel over document (2).

Document (2) discloses a pulp bleaching process including an enzyme treatment which is preferably preceded or followed by a treatment with oxygen or an oxygen containing gas (Claim 1), the preceding treatment being preferred (page 4, lines 16 to 19). There was no disagreement between the parties concerning the facts that the process of document (2) is in particular applied to "kraft pulp" (page 2,

line 13 and examples) which is a synonym for "sulphate pulp" and that the xylanase enzyme used in document (2) is a hemicellulase (page 3, lines 24 to 26). In a further aspect of this process, the lignocellulosic material resulting from at least the oxygen and the xylanase treatments undergoes an alkaline extraction step (page 5, lines 8 to 12).

2.4.1 The Respondents' novelty objection focussed on the following three aspects:

- Firstly, the oxygen treatment in document (2) was not to be considered for the assessment of novelty since it was not part of the bleaching procedure and, therefore, not an oxidation in the same sense as in the patent in suit. The enzyme treatment was consequently the first step of the bleaching procedure of document (2).
  
- Secondly, document (2) disclosed a variety of additional treating stages to be combined in any order with the enzyme and oxygen treatments (page 4, line 52 to page 5, line 21), thereby covering the claimed bleaching sequence with an initial enzyme treatment, followed by the oxidation stage using a chemical containing at least 70% chlorine dioxide and a subsequent alkaline treatment. These additional treating stages were, further, arbitrarily interchangeable, hence also in comparative Example 5 of document (2), where substitution of the stage using a mixture of chlorine and chlorine dioxide by a stage using chlorine dioxide alone would result in the claimed subject-matter.

- Thirdly, being an oxygen-containing gas, chlorine dioxide could be used in the oxygen treatment stage of document (2).

2.4.2 As already explained in point 2.1 above, Claim 1 covers and is confined to an overall process of bleaching sulphate (kraft) pulp - including its delignification - in which the kraft pulp resulting from the digestion process is subjected to a hemicellulase enzyme treatment prior to the very first oxidation step. This first oxidation step makes use of a chemical having a chlorine dioxide content of at least 70%. Consequently, no process for working up sulphate pulp comprising an oxidation step prior to a treatment with hemicellulose - be it designated as bleaching, delignification, pre-treatment or whatever - is covered by Claim 1.

2.4.3 As a consequence, the embodiment according to Example 9 of document (2) wherein the pulp is initially, subjected to an oxygen treatment and then to an enzyme treatment, is distinguished from the claimed process by a different sequential order of the enzyme treatment step and the first oxidation. Contrary to the Respondents' opinion, this example does not destroy the novelty of Claim 1.

2.4.4 The second aspect is based on the fact that according to document (2) the described treatment with oxygen and xylanase may be accompanied by one or more additional treatments, inter alia with chlorine dioxide or with a mixture of chlorine and chlorine dioxide, either before or between said oxygen and xylanase treatments or, preferably, thereafter (page 4, line 52 to page 5, line 7).



This disclosure does not, however, clearly and unambiguously describe the particular combination of reaction stages where from all suggested additional treatment steps the intermediate treatment with chlorine dioxide is selected and applied to the particular sequence of initial enzyme treatment and subsequent oxygen treatment.

Further, while stating that "the material resulting from at least **the oxygen** and enzyme treatments" (page 5, lines 8 to 12, emphasis added) is subjected to an alkaline extraction stage, document (2) does not unequivocally disclose such an alkaline extraction to be also applied if the oxygen treatment was preceded by a treatment with chlorine dioxide, contrary to what is mandatory in the process claimed in the patent in suit.

Finally, the Respondents submitted that Example 5 of document (2) anticipated the process of the patent in suit. This example is a comparative one and not one according to the invention taught in document (2). It discloses the bleaching of a xylanase treated pulp in a so-called C/D stage by a mixture of chlorine and chlorine dioxide (page 10, lines 56 to 58), in which the amount of chlorine (2.14%) exceeds by far that of chlorine dioxide (0.09%) contrary to what is required for the process of the patent in suit. Any consideration that this C/D stage could be replaced by one of the "additional treatments" disclosed in document (2) and, therefore, also by a treatment with (pure) chlorine dioxide is flawed since these "additional treatments" are only disclosed in relation to the process invention of citation (2) and have no connection to the comparative process of Example 5.

2.4.5 Referring to page 4, lines 16 to 17 of citation (2), the Respondents also argued that the oxygen containing gas to be used in the oxygen treatment stage of document (2) could be chlorine dioxide, since the molecules of the latter contain oxygen. The Board cannot accept this argument. The respective passage reads:

"In the process according to the present invention, the treatment with xylanase may precede the treatment with oxygen or an oxygen-containing gas."

There cannot be any doubt that the term oxygen denotes a gas composed of oxygen molecules. According to normal rules for construction of a technical text, a particular term will maintain its meaning throughout that text provided there is no information to the contrary available. The Board is not aware of such information nor did the Respondents point to any passage in document (2) to that end. Therefore, the term oxygen has the same meaning as given above whenever it appears in document (2). It follows that "oxygen-containing gas" denotes a gas containing molecular oxygen, perhaps also containing, but not consisting of, chlorine dioxide. This finding is corroborated by page 4, line 27 of citation (2), where air, which is doubtless a gas containing molecular oxygen is mentioned as the only example of an oxygen-containing gas.

2.4.6 The Board therefore concludes that the processes disclosed in document (2) differ from the claimed one insofar as they include an oxidation treatment prior to any oxidation with a chemical containing at least 70 % chlorine dioxide. For these reasons, the Board decides

that the invention as set out in accordance with the auxiliary request is not anticipated by the disclosure of document (2).

3. The contested decision is, consequently, set aside. Since the other grounds for opposition under Article 100(a) EPC have not yet been considered by the Opposition Division, the Board exercises its discretion under Article 111(1) EPC and remits the case to the latter for further prosecution on the basis of the auxiliary request.

## **Order**

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

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division for further prosecution on the basis of Claims 1 to 5 of the auxiliary request.

The Registrar:

The Chairman:

G. Rauh

P. Krasa