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**Datasheet for the decision  
of 9 October 2007**

**Case Number:** T 0006/05 - 3.3.10

**Application Number:** 96936468.6

**Publication Number:** 0856038

**IPC:** C09K 5/00

**Language of the proceedings:** EN

**Title of invention:**

Hydrofluoroethers as low temperature refrigerants

**Patentee:**

MINNESOTA MINING AND MANUFACTURING COMPANY

**Opponent:**

SOLVAY SOLEXIS S.p.A.

**Headword:**

Method for transferring heat/SOLVAY SOLEXIS

**Relevant legal provisions (EPC 1973):**

EPC Art. 54, 56, 107, 108, 111(1), 123(2)  
EPC R. 20, 65(1)

**Keyword:**

"Admissibility of opponent's appeal (yes) - universal  
successor of opponent automatically acquired party status"  
"Main request and auxiliary requests 1 and 6: novelty (yes) -  
no direct and unambiguous disclosure; inventive step (no) -  
improvement not shown - reformulation of problem - obvious  
alternative"  
"Auxiliary request 7: inventive step (yes)"

**Decisions cited:**

G 0004/88, G 0002/04, T 0270/90, T 0800/91, T 0870/92,  
T 0939/92, T 0068/95, T 0355/97, T 1137/97, T 0015/01,  
T 0413/02, T 0229/03, T 0261/03

**Catchword:**

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Case Number: T 0006/05 - 3.3.10

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.10  
of 9 October 2007

**Appellant:** SOLVAY SOLEXIS S.p.A.  
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I-20121 Milano (IT)

**Representative:** Sama, Daniele  
Sama Patents  
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**Respondent:** MINNESOTA MINING AND MANUFACTURING COMPANY  
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**Representative:** Voortmans, Gilbert J.L.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 22 October 2004  
rejecting the opposition filed against European  
patent No. 0856038 pursuant to Article 102(2)  
EPC 1973.

**Composition of the Board:**

**Chairman:** R. Freimuth  
**Members:** J. Mercey  
P. Schmitz

## Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal on 14 December 2004 against the decision of the Opposition Division dated 22 October 2004 rejecting the opposition against European patent No. 856 038 which was granted on the basis of twenty one claims, and on 21 February 2005 filed a written statement setting out the grounds of appeal. Claims 1 and 7 of the granted patent read as follows:

"1. A method for transferring heat, comprising the steps of:  
providing a heat source;  
providing a heat sink; and  
transferring heat between the heat source and the heat sink through the use of a heat transfer medium comprising a fluorinated ether;  
wherein the heat sink is cooled to a temperature of less than about -15°C."

"7. The method of claim 1, wherein the fluorinated ether is a compound of the formula  
 $R_f-O-R$   
wherein  $R_f$  is a perfluorinated alkyl, aryl, or alkylaryl group, and wherein R is a non-fluorinated alkyl, aryl, or alkylaryl group."

II. Notice of Opposition had been filed by the Appellant requesting revocation of the patent as granted in its entirety on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC) and insufficient disclosure (Article 100(b) EPC). *Inter alia* the

following documents were submitted in opposition proceedings:

- (1) Brochure "Galden HT", 040495, Ausimont K.K., Tokyo, in the form of an English translation thereof,
- (2) Brochure "Galden Electronic Fluids", Montefluos, Milano, Jun. 86,
- (3) Brochure "Galden HT Heat Transfer Fluids", in the form of an English translation thereof,
- (4) Brochure "Galden", Ausimont K.K., Tokyo, 021592, in the form of an English translation thereof,
- (5) Brochure "Galden HT", Nippon Montedison K.K., in the form of an English translation thereof,
- (6) Brochure "Galden HT", Nippon Montedison K.K., 110789, in the form of an English translation thereof,
- (7) Technical Bulletin "Galden Perfluoropolyether (PFPE)", Ausimont USA,
- (8) WO-A-9 532 174,
- (9) G. Marchionni and P. Srinivisan, Perfluoropolyethers, Synthesis and Commercial Products, Fluoropolymers Conference 1992, Paper 14, pages 1 to 10,
- (15) A. Suca et al., Properties of fluorinated ethers, 12th Winter Conference, January 22 - January 27, 1995,
- (17) D. Silanesi, Polieteri perfluorati, La Chimica e l'Industria, Vol. 50, pages 206 to 214, February 1968, in the form of an English translation thereof,
- (19) E. Granyd and Å. Melinder, Secondary Refrigerants for indirect refrigeration and heat pump systems, SCANREF 4/94, pages 14 to 20 and

(21) Kirk-Othmer, Encyclopedia of Chemical Technology, 4th Ed., 1994, Vol. 11, pages 525 to 533.

III. The Opposition Division held that the invention was sufficiently disclosed, was novel over the disclosure of documents (2), (8), (17) and (21) and involved an inventive step over documents (19) and (21). It also held that the documents (1) and (3) to (7) were not available to the public before the priority date of the patent in suit.

IV. In a communication dated 11 January 2006 pursuant to Article 110(2) EPC, the Board asked the Appellant to clarify the inconsistency between the fact that opposition was filed by Ausimont S.p.A and appeal was filed by Solvay Solexis S.p.A.

V. With letter dated 20 February 2006, the Appellant submitted that Solvay Solexis S.p.A was the universal successor of Ausimont S.p.A. and provided as documentary support a notarial certificate dated 6 February 2004 attesting the various mergers and changes of name of the opponent Ausimont S.p.A.

VI. With letter dated 6 September 2007, the Appellant filed *inter alia* the following document:

(35) G.S. Mand and G.V. Bailak, "A Calibration Facility for Satellite Borne Remote Sensing Instruments", presented at 8th CASI Conference on Astronautics, Ottawa, Ontario, 1994, file created on 25 August 1995

and argued that the subject-matter of claim 1 of the main request was not novel over the disclosure thereof.

VII. At the oral proceedings before the Board, held on 9 October 2007, the Respondent (Proprietor of the Patent) defended the maintenance of the patent in suit as granted, or subsidiarily, on the basis of auxiliary request 1, filed before the Opposition Division, or on the basis of auxiliary requests 6 to 9, submitted during the oral proceedings before the Board, or on the basis of auxiliary request 10, submitted as auxiliary request 6 before the Opposition Division. During the oral proceedings before the Board, the Respondent withdrew auxiliary requests 2 to 5.

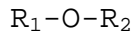
Claims 1 and 7 of auxiliary request 1 differed from claims 1 and 7 of the main request exclusively in that the feature "fluorinated ether" was replaced by "hydrofluoroether".

Independent claim 2 of auxiliary request 6 corresponded to a combination of claims 1 and 7 of the main request.

Claim 1 of auxiliary request 7 read as follows:

"1. A method for transferring heat, comprising the steps of:  
providing a heat source;  
providing a heat sink; and  
transferring heat between the heat source and the heat sink through the use of a heat transfer medium comprising a fluorinated ether;

wherein the heat sink is cooled to a temperature of less than about  $-15^{\circ}\text{C}$  and wherein the fluorinated ether is a compound of the formula:



wherein  $\text{R}_1$  and  $\text{R}_2$  are the same or different and are selected from the group consisting of alkyl, aryl, and alkylaryl groups and wherein at least one of  $\text{R}_1$  and  $\text{R}_2$  contains at least one fluorine atom, and at least one of  $\text{R}_1$  and  $\text{R}_2$  contains at least one hydrogen atom and wherein one or both of  $\text{R}_1$  and  $\text{R}_2$  contain one or more caternary or noncaternary heteroatoms."

VIII. The Appellant argued that the subject-matter of claim 1 of the main request was not novel over any of the disclosures of documents (1) to (8), (17), (21) or (35), which all described a secondary loop refrigeration system wherein the heat transfer agent was a fluorinated ether. The subject-matter of auxiliary request 1 was not novel over the disclosures of documents (17) or (21), which specifically disclosed hydrofluoroethers as heat transfer fluids.

In the assessment of inventive step, the Appellant argued that document (22) should be regarded as the closest state of the art and not document (19). This was because document (22) was concerned with the use of chlorofluorocarbons as secondary refrigerants and one of the aims of the present invention outlined on page 2, lines 16 to 22 and page 3, lines 16 to 18 of the specification of the patent in suit, namely to provide an environmentally friendly refrigeration method, was formulated in the light of the drawbacks of *inter alia* such chlorofluorocarbons. Starting however from document (19), which disclosed various secondary

refrigerants for indirect refrigeration, the Appellant submitted that the problem to be solved by the patent in suit was to provide merely a further refrigeration method, no improvement having been shown for any of the fluorinated ethers of the invention *vis-à-vis* the brines of document (19). Since hydrofluoroethers, more particularly compounds of general formula  $R_f-O-R$  according to claim 7 of the main request and auxiliary request 1, and of claim 2 of auxiliary request 6, were known from document (15) as refrigerants, the skilled person would have used such ethers to transfer heat from a heat source to a heat sink. Thus the subject-matter of claim 1 of the main request and auxiliary request 1, and that of claim 2 of auxiliary request 6, was not inventive. With regard to auxiliary request 7, the subject-matter thereof was not inventive over the teaching of document (19), in combination with that of any of documents (9), (17) or (21), since all of these latter documents taught the use of hydropolyethers of the formula  $R_1-O-R_2$  according to claim 1 of auxiliary request 7 as refrigerants.

At the oral proceedings before the Board, the Appellant no longer maintained that the invention was insufficiently disclosed.

- IX. The Respondent argued that the appeal was inadmissible, since the evidence provided by the Appellant did not prove that Solvay Solexis S.p.A. was the universal successor of Ausimont S.p.A. Accordingly, Solvay Solexis S.p.A. was not a party to the first instance proceedings and the conditions of Article 107 EPC had not been complied with. The Respondent argued essentially that the address given for the registered



office of Ausimont in the notarial certificate was different from the postal address for Ausimont which filed the opposition; this notarial certificate was provided on 20 February 2006, whereas the appeal was filed on 14 December 2004, such that, by applying Rule 20(3) EPC, Solvay Solexis did not have status of party to the proceedings when it filed the appeal; and, finally, at the time of oral proceedings before the Opposition Division, the Opponent was identified as Ausimont, at a time when Ausimont no longer existed.

The Respondent submitted that none of the documents (1) to (8), (17), (21) or (35) was novelty destroying, since none of these documents disclosed a method in which a heat sink was cooled to  $-15^{\circ}\text{C}$  or less.

With regard to inventive step, the Respondent submitted that starting from document (19), the problem to be solved by the patent in suit was to provide a method of refrigeration with a shorter cooling time. Example 12 of the patent in suit showed that this problem had been successfully solved, since it showed that a fluorinated ether according to the invention resulted in a shorter cooling time than a water/propylene glycol mixture according to document (19). Figure 4 also demonstrated that the temperature difference factor at  $-15^{\circ}\text{C}$  for a hydrofluoroether according to the invention, namely  $\text{C}_4\text{F}_9\text{OCH}_3$ , was lower than for the fluids DOWJ and PG according to document (19), and that at temperatures lower than ca.  $-20^{\circ}\text{C}$ ,  $\text{C}_4\text{F}_9\text{OCH}_3$  was better than  $\text{CaCl}_2$ . The skilled person would not have combined document (19) with document (15), since this latter document, although mentioning refrigerants, did not teach indirect cooling, namely transferring heat from a heat

source to a heat sink. The Respondent argued that none of documents (9), (17) or (21) specifically taught the use of hydropolyethers as refrigerants, such that the subject-matter of auxiliary request 7 was also inventive.

- X. The Respondent requested that the appeal be dismissed and that the patent be maintained as granted, or, subsidiarily that the patent be maintained on the basis of auxiliary request 1 submitted before the Opposition Division or on the basis of auxiliary requests 6 to 9 submitted during the oral proceedings before the Board, or, on the basis of auxiliary request 10, submitted as auxiliary request 6 before the Opposition Division. Furthermore, it requested that the case be remitted to the first instance in the case that the patent was not maintained as granted or according to auxiliary request 1.

The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

- XI. At the end of the oral proceedings, the decision of the Board was announced.

## **Reasons for the Decision**

### 1. *Admissibility of the appeal*

- 1.1 According to Article 107 EPC, first sentence, only a party to the proceedings adversely affected by a decision may file an appeal. If an appeal does not comply with Article 107 EPC, the Board of Appeal shall

- reject it as inadmissible, unless each deficiency has been remedied before the relevant time limit laid down in Article 108 EPC has expired (Rule 65(1) EPC).
- 1.2 In the present case, opposition was filed by Ausimont S.p.A., having the postal address Piazzetta Maurilio Bossi 3, Milano and this party was the opponent throughout the opposition proceedings. An appeal was filed by Solvay Solexis S.p.A. Therefore the question which needs to be answered is whether or not the Appellant Solvay Solexis S.p.A. was a party to the opposition proceedings adversely affected by the decision under appeal.
- 1.3 According to decision G 2/04 (OJ EPO 2005, 549), the status as an opponent cannot be freely transferred. However, it passes to the universal successor in law in the case of universal succession e.g. in the case of a merger of legal persons (G 4/88, OJ EPO 1989, 468, point 4 of the reasons). Such transfer is not only allowed in pending opposition proceedings but also in subsequent opposition appeal proceedings. If a third party claims that the opponent or appellant status has been transferred to him, he has to produce sufficient evidence to satisfy the Opposition Division or the Board of Appeal that a transfer has occurred.
- 1.4 In the present case, the Appellant has filed a certificate from a notary public from which it is clear that MONTEDISON INTERMEDI E AUSILIARI CHIMICI PER L'INDUSTRIA S.P.A., in brief AUSIMONT S.P.A., with registered offices in Milano, via Turati 12, merged by way of absorption of MONTEDISON INTERMEDI E AUSILIARI CHIMICI PER L'INDUSTRIA S.P.A into AGORA S.P.A. and

then of AGORA S.P.A into SOLVAY FLUORATI HOLDING S.P.A.  
Afterwards the name was changed into AUSIMONT S.P.A.  
With effect as from 1 January 2003, a further name  
change took place into SOLVAY SOLEXIS S.P.A.

The Board of Appeal considers this evidence as  
sufficient to show that the company Solvay Solexis  
S.p.A. is the universal successor of the company  
Ausimont S.p.A. having filed the opposition.

- 1.5 The Respondent contested the sufficiency of this  
evidence and submitted that in the notarial certificate  
only the company Montedison Intermedi e Ausiliari  
Chimici per L'Industria S.p.A. was mentioned and that  
it was not clear whether this company was the one which  
had originally filed the opposition. In addition, via  
Turati was given as the company's address and not the  
address Piazzetta Maurilio Bossi indicated in the notice  
of opposition.

However, the notarial certificate states that the name  
Ausimont S.p.A. is the short form of the company  
Montedison Intermedi e Ausiliari Chimici per  
L'Industria S.p.A. so that the name in the notarial  
certificate is clearly linked to the Opponent's name  
given in the notice of opposition. With respect to the  
different addresses of that company, the Appellant  
submitted that it had several offices, *inter alia* one  
in via Turati and one in Piazzetta Maurilio Bossi. This  
finding is common in business practice. Since the  
Appellant's explanations are credible, credibility  
being the level of proof to be applied in such a case  
(T 261/03, point 3.5.5 of the reasons, not published in  
OJ EPO), the Board is satisfied with the evidence filed.

1.6 The Respondent argued that the transfer had effect only as from the date when documents demonstrating that a transfer had taken place had been produced. Since such documents were filed only on 20 February 2006, i.e. after expiry of the appeal period, the Appellant did not acquire party status by the end of the appeal period and thus the appeal had to be rejected as inadmissible.

1.6.1 Unlike in the case of the transfer of European patents, the EPC does not contain any explicit provisions with respect to the transfer of the opponent status and decision G 4/88 (*loc. cit.*) dealing with the transfer of oppositions did not establish any criteria with regard as to when the transfer becomes effective in the procedure. According to Rules 20(3) and 61 EPC, the transfer of a European patent shall have effect *vis-à-vis* the EPO only when documents satisfying the EPO that the transfer has taken place have been produced. The established jurisprudence of the Boards of Appeal has applied this principle *mutatis mutandis* to the transfer of the opponent status (see e.g. T 870/92, point 3.1 of the Reasons, T 413/02, point 3 of the reasons, T 229/03, points 3 and 5 of the reasons and T 1137/97, point 4 of the reasons, all not published in OJ EPO). To apply the same requirements to the patent proprietor and the opponent seems to be justified by the principle of equal treatment of the parties to the proceedings.

1.6.2 However, in the above cited cases, the opposition was transferred together with the assignment of those particular business assets in the interests of which the opposition was filed, whereas in the present case,

the opponent status passed to the present opponent from the original opponent due to universal succession *via* merger.

- 1.6.3 The universal successor of a patent proprietor automatically acquires party status in proceedings pending before the EPO, since Rule 20(3) EPC does not apply in the context of universal successions in law. When a patent proprietor, due to a merger, ceases to exist, his universal successor in law immediately and automatically acquires the party status, thus preventing any procedural "vacancy", because a person no longer existing cannot remain party to the proceedings (see decision T 15/01, OJ EPO 2006, 153, points 9, 10 and 12 of the reasons).

Accordingly, in the case of universal succession of the patent proprietor, there is only one (legal) person remaining, namely the universal successor who enjoys all the rights and is subject to all the obligations of its predecessor, whose legal status it assumes. In contrast, when transferring a patent by assignment, only a specifically designated right is transferred to a third party and the former patent proprietor, i.e. the assignor, continues to exist.

Thus in the case of universal succession of the patent proprietor, the successor automatically acquires party status from the date on which the merger becomes effective and not only once sufficient evidence to this effect has been produced.

- 1.6.4 Since, as set out in point 1.6.1 above, the principles for transferring a European patent are to be applied

*mutatis mutandis* to the transfer of the opponent status, it is justified to apply the particular considerations and conclusions with respect to the transfer of patents due to universal succession (see point 1.6.3) also to the transfer of the opponent status due to universal succession.

In the case of universal succession of the opponent, there can only be one (legal) person who has rights and obligations, with the consequence that there is necessarily and automatically a continuation of the existing legal status as opponent from the date of the merger. It can thus be established unambiguously and without any legal uncertainty, at any point in time in the proceedings who in fact is the opponent having party status, regardless of the date when sufficient evidence to this effect was filed.

In the case of transfer by assignment of particular business assets from one (legal) person to another, however, the original opponent continues to exist and the assignee acquires, together with the business assets, the opportunity to become opponent, and party status, in opposition proceedings, but does not acquire this status automatically, since the original opponent may continue the opposition proceedings. If the assignee who acquired the particular business assets wishes to become a party to the opposition proceedings, it is justified to grant it party status only at the date when sufficient evidence has been produced, because the original opponent only then loses, as a consequence, its party status.

Thus, in the case of universal succession, the opponent automatically acquires party status, unlike in the case when the status as opponent is agreed to be transferred together with the assignment of business assets. In this latter situation, the party status may either remain with the original opponent or be transferred to the new opponent. Therefore, the requirements for the filing of evidence and the conclusions to be drawn therefrom are necessarily different in both cases.

1.7 Thus, in the case of transfer of the opposition by way of universal succession, the universal successor automatically acquires the bundle of procedural rights of his predecessor and hence party status from the date on which the merger became effective and not only once sufficient evidence to this effect has been produced. This finding satisfies the principle of equal treatment of all parties to the proceedings (cf. point 1.6.1 above) in the case of universal successors of both patent proprietors and opponents.

1.8 Furthermore, for the above reasons, the fact that the proceedings before the Opposition Division were conducted in the name of the original opponent, i.e. Ausimont S.p.A., amounts merely to a wrong designation of the true party and has no procedural consequences.

1.9 Since, in the present case, the appeal was filed in the name of the universal successor and since he has automatically acquired party status, he is adversely affected by the decision under appeal and, hence, the appeal is admissible.



*Main request*

2. *Novelty*

2.1 The Appellant challenged the novelty of the claimed invention with regard to the disclosures of documents (1) to (8), (17), (21) and (35). In the circumstances of this case, the Board limits its considerations with respect to novelty to these documents.

2.2 The Board observes that it is a generally applied principle that for concluding lack of novelty, there must be a direct and unambiguous disclosure in the state of the art which would inevitably lead the skilled person to subject-matter falling within the scope of what is claimed.

2.3 Documents (1) to (7) and (21) all disclose *Galden*<sup>®</sup> fluids, said fluids being mixtures of perfluoropolyethers, and their use as heat transfer fluids. The boiling points and pour points of various *Galden*<sup>®</sup> fluids are disclosed, and various examples of working temperature ranges are given. However, there is no disclosure in any of these documents of the working temperature of a refrigeration system, let alone of a heat sink that is cooled to less than -15°C.

Document (8), which is comprised in the state of the art according to Article 54(3) and (4) EPC, discloses hydrofluoroethers (cf. claim 1) as heat transfer agents (cf. page 26, lines 1 to 2). However, there is no disclosure of a heat sink that is cooled to less than -15°C.

Document (17) discloses perfluoropolyethers for use as fluids for heat transmission (cf. page 32, lines 14 to 19). Again, however, there is no disclosure of a heat sink that is cooled to less than  $-15^{\circ}\text{C}$ .

Document (35) discloses a main calibration blackbody target (MCBB), which when operated over a temperature range of 220 to 350K, namely from  $-53$  to  $77^{\circ}\text{C}$ , is cooled via a coolant ring and jacket arrangement with a re-circulating chiller in conjunction with a Galden<sup>®</sup> fluid (cf. page 3, under "Radiometric Targets", second paragraph and Fig. 5). However, the temperature range of  $-53$  to  $77^{\circ}\text{C}$  is that of the heat source and not of the heat sink, for which no temperature is disclosed.

2.4 There is thus no direct and unambiguous disclosure in any of these documents of a heat sink that is cooled to less than  $-15^{\circ}\text{C}$ .

2.5 Therefore, the Board concludes that the subject-matter of claim 1 of the main request is novel within the meaning of Articles 52(1) and 54 EPC.

### 3. *Inventive step*

3.1 Claim 1 of the main request and of auxiliary request 1 embraces the embodiment wherein the heat transfer medium is an ether of general formula  $R_f\text{-O-R}$ , said embodiment being the subject-matter of dependent claim 7 of each of these requests and of independent claim 2 of auxiliary request 6 (cf. points I and VII above). In case this embodiment according to the main request lacked inventive step, the subject-matter of the auxiliary requests 1 and 6, which also embraces

that obvious embodiment, could not involve an inventive step either. For this reason, it is appropriate that the subject-matter of claim 1 of the main request, insofar as it relates to the embodiment wherein the heat transfer medium is an ether of general formula  $R_f-O-R$ , is examined first as to its inventive ingenuity.

3.2 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures assessing inventive step on an objective basis and avoids an *ex post facto* analysis.

3.3 The patent in suit is directed to a refrigeration method. A similar refrigeration method already belongs to the state of the art in that document (19) describes secondary refrigerants used in refrigeration systems to transport heat from the heat source (cf. page 14, second paragraph). In Diagram 8 on page 20 thereof, the temperature difference factor ( $F\theta$ ) for different media, both aqueous and non-aqueous, is given for temperatures of *inter alia*  $-15^\circ\text{C}$  and below, factor  $F\theta$  characterising the temperature difference in turbulent flow in tubes in a given heat exchanger with a given heat flux and given specific pumping power. It is beneficial that a heat transfer fluid has a low value on factor  $F\theta$  (cf. document (19), page 20, left hand column). Amongst the heat transfer media exemplified in Diagram 8 is an aqueous solution of calcium chloride ( $\text{CaCl}_2$ ).

3.3.1 Where the patent in suit indicates a particular piece of prior art as the starting point for determining the problem underlying the patent in suit, in the present case document (19) in paragraph [0011] of the patent specification, then the Board should adopt this as the starting point for the purpose of a problem-solution analysis unless it turns out that there is closer state of the art of greater technical relevance (see e.g. decisions T 800/91, point 6 of the reasons; T 68/95, point 5.1 of the reasons, neither published in OJ EPO).

3.3.2 The Appellant argued at the oral proceedings before the Board that rather document (22), was the closest state of the art. However, the Board cannot see any reason why the disclosure of document (22) is of greater technical relevance to the claimed invention than that of document (19). On the contrary, document (22), describes *inter alia* the use of trichlorofluoromethane for low temperature heat transfer.

Trichlorofluoromethane belongs, however, to the class of chlorofluorocarbons described in the patent in suit (cf. paragraph [0003]) as environmentally unfriendly, said environmental impact eliminating just such heat transfer media from consideration.

3.3.3 Thus, the Board considers, in agreement with the Opposition Division and both parties in the written procedure before the Board, that in the present case the refrigeration method of document (19) represents the closest state of the art and, hence, takes it as the starting point when assessing inventive step.

- 3.4 In view of this state of the art, the problem underlying the patent in suit, as formulated by the Respondent at the oral proceedings, consists in providing a method of refrigeration with a shorter cooling time.
- 3.5 As the solution to this problem, the patent in suit proposes a method for transferring heat using a heat sink which is cooled to  $-15^{\circ}\text{C}$  as defined in claim 1, characterised in that the heat transfer medium is a fluorinated ether, in particular a hydrofluoroether of general formula  $\text{R}_f\text{-O-R}$  according to claim 7.
- 3.6 To demonstrate that the method of refrigeration as defined in claim 7 achieves the alleged reduction in cooling time, the Respondent, who by alleging this fact carries the burden of proving it (see decisions T 270/90, OJ EPO 1993, 725, point 2.1 of the reasons, T 355/97, point 2.5.1 of the reasons, not published in OJ EPO), relied on Example 12 and Figure 4 comprised in the specification of the patent in suit.
- 3.6.1 The Respondent conceded at the oral proceedings before the Board that in the secondary refrigeration system used in Example 12 comprised in the patent specification, no temperature was indicated for the heat sink although it is required to be less than  $-15^{\circ}\text{C}$  according to claim 1. Thus, this example does not truly reflect the claimed subject-matter and does not properly demonstrate that the purported improvements of the claimed refrigeration method have been successfully achieved *vis-à-vis* the closest state of the art. As a consequence, it must be disregarded in the assessment of inventive step.

3.6.2 With regard to Figure 4 of the patent in suit, the Respondent submitted that this demonstrated that at heat sink temperatures below about  $-20^{\circ}\text{C}$ , a method using a hydrofluoroether according to the invention, namely  $\text{C}_4\text{F}_9\text{OCH}_3$ , was better than a method using a solution of  $\text{CaCl}_2$  according to document (19). However, the Respondent conceded that at heat sink temperatures of about  $-15$  to  $-20^{\circ}\text{C}$ , this improvement was not achieved, but that on the contrary, a solution of  $\text{CaCl}_2$  was better than  $\text{C}_4\text{F}_9\text{OCH}_3$ .

3.6.3 A purported technical effect, in the present case the reduction in cooling time of the claimed method, can form the basis for a finding of inventive step only if it were credible that substantially all the claimed embodiments possessed this improvement (see decision T 939/92, OJ EPO 1996, 309, point 2.5.4 of the reasons).

In the present case, at temperatures of about  $-15$  to  $-20^{\circ}\text{C}$ , a method using  $\text{C}_4\text{F}_9\text{OCH}_3$  according to the invention resulted in a higher temperature difference factor, which corresponds to a longer cooling time, than a comparative method using a solution of  $\text{CaCl}_2$  according to the closest prior art. Since the proposed solution to the problem posed embraces embodiments wherein the heat sink is cooled to a temperature of about  $-15$  to  $-20^{\circ}\text{C}$  (see point 3.5 above), and the purported improvement is not attained in this temperature range, at least within this range the problem formulated in point 3.4 above is not successfully solved.

3.7 Thus, since the technical effect on which the inventive step is based, namely improvement of cooling time, is not attained throughout the entire range covered by the claimed subject-matter, the technical problem as defined in point 3.4 above needs to be redefined in a less ambitious way. In view of the teaching of document (19), the objective problem underlying the patent in suit is merely the provision of a further refrigeration method.

3.8 Finally, it remains to decide whether or not the proposed solution to that objective problem underlying the patent in suit is obvious in view of the state of the art.

3.8.1 Document (15) describes the hydrofluoroethers  $C_3F_7-O-C_2H_5$  and  $C_4F_9-O-C_2H_5$ , together with various physical data therefor, such as boiling point, thermal conductivity and specific heat, and teaches their use as refrigerants (cf. pages 21 and 36). Using one of these hydrofluoroethers exemplified in document (15) as a heat transfer fluid in a refrigeration method according to document (19) was well within the routine practice of the skilled person, faced with the mere problem of providing a further refrigeration method, thereby arriving without inventive ingenuity at the solution proposed by the patent in suit, in particular the preferred one according to claim 7.

3.9 The Respondent argued in support of inventive step that the skilled person, when seeking an alternative refrigeration method to that of document (19), would not have combined document (19) with document (15),

since document (15) did not teach indirect cooling, namely the use of a secondary loop refrigeration system.

However, nothing was submitted by the Respondent from which the Board could reasonably conclude that the skilled person has been deterred from following the straight teaching of the art. The type of cooling, whether indirect or not, however, is irrelevant in the assessment of obviousness in the present case, since the claimed solution is exclusively characterised by the choice of particular fluorinated ethers as heat transfer media (see point 3.5 above). Document (15) teaches these particular hydrofluoroethers to be used as refrigerants, and since the problem to be solved was merely the provision of a further refrigeration method, the skilled person would take document (15) into consideration when seeking an alternative refrigeration method to that of document (19).

3.10 For these reasons, the solution proposed in claim 1 to the problem underlying the patent in suit, at least insofar as it relates to the method wherein the heat transfer medium is an ether of general formula  $R_f-O-R$ , is obvious in the light of the prior art.

3.11 As a result, the Appellant's main request is not allowable for lack of inventive step pursuant to Article 56 EPC.



*Auxiliary requests 1 and 6*

4. *Admissibility*

4.1 Auxiliary request 1 was already filed before the Opposition Division and is thus clearly admissible.

4.2 In response to objections raised for the first time during the oral proceedings before the Board with regard to support in the application as filed (Article 123(2) EPC) for subject-matter in a request filed before the Opposition Division, the Respondent submitted auxiliary request 6 containing minor amendments prompted by the objections raised. Therefore these amendments are considered to be appropriate and necessary. Furthermore, the Appellant was not hindered in its argumentation with regard to inventive step by the amendments carried out at the oral proceedings before the Board in the claims of this request, since these amendments did not amount to creating a fresh case necessitating a reconsideration of the objections and evidence brought forward so far by the Appellant against the patentability of the claimed subject matter. For these reasons the Board exercises its discretion to admit auxiliary request 6 into the proceedings.

5. *Inventive step*

5.1 Since claim 1 of auxiliary request 1 includes the embodiment wherein the heat transfer medium is an ether of general R<sub>f</sub>-O-R and independent claim 2 of auxiliary request 6 relates to this embodiment only (cf. point 3.1 *supra*), the considerations having regard to inventive step given in points 3.2 to 3.8 *supra* and the

conclusion drawn in point 3.9 *supra* with respect to the main request apply also to auxiliary requests 1 and 6, i.e. the subject-matter claimed is obvious and does not involve an inventive step.

- 5.2 In these circumstances, the auxiliary requests 1 and 6 share the fate of the main request in that they too are not allowable for lack of inventive step pursuant to Article 56 EPC.

#### *Auxiliary request 7*

#### 6. *Admissibility*

This request was filed during the oral proceedings before the Board. This request results from amendments of a request which was filed before the Opposition Division, the amendments being made in response to objections raised for the first time during these oral proceedings with regard to support in the application as filed (Article 123(2) EPC); said request has been amended in a manner identical to that by which auxiliary request 6 was amended. Thus, the Board exercises its discretion to admit auxiliary request 7 into the proceedings for the same reasons as given in point 4.2 above.

#### 7. *Amendments (Article 123 EPC)*

- 7.1 The subject-matter of claim 1 is disclosed on page 8, lines 20 to 25 of the application as filed, whereby the original optional feature that one or both of  $R_1$  and  $R_2$  contain one or more caternary or noncaternary heteroatoms has been made mandatory. The specification

that said feature is mandatory results from a single selection and, thus, does not add subject-matter.

Independent claims 3 and 5 are supported by claims 25 and 27 as filed, respectively, in combination with the above cited passage on page 8, lines 20 to 25. Claims 2 and 4 are supported by claims 22 and 26 as filed, respectively.

7.2 For these reasons, the Board concludes that the subject-matter of claim 1 does not extend beyond the content of the application as filed, such that the requirements of Article 123(2) EPC are satisfied.

7.3 These amendments bring about a restriction of the scope of the claims as granted, and therefore of the protection conferred thereby, which is in keeping with the requirements of Article 123(3) EPC.

## 8. *Sufficiency of Disclosure and Novelty*

Sufficiency of disclosure and novelty were no longer contested during the oral proceedings before the Board. Hence, it is unnecessary to go into more detail in this respect.

## 9. *Inventive Step*

9.1 Document (19) remains the closest prior art while the technical problem is still the provision of a further refrigeration method (cf. points 3.3 and 3.7 above), which finding was not disputed by the Respondent. The solution proposed to this problem is the method of

claim 1 using the particular fluorinated ethers of general formula  $R_1-O-R_2$  (cf. point VII above).

9.2 Finally, it remains to decide whether or not the proposed solution to that objective problem underlying the patent in suit is obvious in view of the state of the art.

9.2.1 Document (9) teaches the use of **per**fluoropolyethers (PFPE's) as heat transfer agents (cf. page 4, second and fourth paragraphs under the heading "Electronics"). The first full paragraph on page 7 reports that "hydrogen containing PFPE's", without disclosing the chemical formulae thereof, had been developed in order to reduce the global warming potential (GWP) without losing their unique properties.

However, document (9) teaches the use of **per**fluoro compounds, which are not covered by the claimed invention as amended, as heat transfer agents, while this document does not teach the "hydrogen containing PFPE's" for that particular use, let alone as refrigerants. Furthermore, the expression "hydrogen containing PFPE's" on page 7 is in itself unclear, since it makes no technical sense, perfluoropolyethers, by nature of their perfluorination, excluding the presence of hydrogen.

9.2.2 Document (17) discloses hydrofluoropolyethers according to claim 1 (cf. Table 3 on page 20), but the passages from page 31, line 23 to page 32, line 5 and page 32, lines 14 to 19 of that document dealing with refrigerants are not directly related to those hydrofluoropolyethers and, thus, do not teach the use of such

compounds as refrigerants and heat transfer fluids. Rather, the former passage addresses compounds different to those of the present invention, namely "simple compounds which can be defined as micromolecular" to be used as refrigerants, and the latter passage also addresses different compounds, namely **per**fluorinated polyethers, to be used as fluids for heat transmission. In neither case are the hydrofluoropolyethers of Table 3 described for use as refrigerants/heat transfer agents.

- 9.2.3 Document (21) teaches the preparation of perfluoropolyethers by polymerization, whereby *via* subsequent reactions, (per)fluoropolyethers containing the OCFHCF<sub>3</sub> end group may be obtained (cf. page 530). Regardless of whether or not this section specifically describes hydrofluoropolyethers according to claim 1, their use as a coolant is not taught in this document. On page 532, lines 3 to 4 and 12 to 13, the applications described, namely direct contact cooling of electronic components and as a coolant for ion implanters, are clearly uses of **per**fluorinated liquids, said compounds being outside the claimed invention.
- 9.3 Accordingly, there is no suggestion in any of the documents (9), (17) and (21) addressed by the Appellant to support its objection of obviousness to use the fluorinated ethers of general formula R<sub>1</sub>-O-R<sub>2</sub> according to claim 1 as a heat transfer medium in order to provide a further method of refrigeration.
- 9.4 For these reasons the Board concludes that the subject-matter of claim 1, and by the same token, that of independent claims 3 and 5, relating to a heat transfer

system and a refrigeration system respectively, and of dependent claims 2 and 4, involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

*Auxiliary requests 8 to 10*

10. Since the auxiliary request 7 is allowable for the reasons set out above, there is no need for the Board to decide on these lower ranking auxiliary requests.

11. *Remittal*

11.1 Having so decided, the Board has not, however, taken a decision on the whole matter, since substantial amendments to the description are required in order to bring it into conformity with the claims of the patent in suit as amended according to auxiliary request 7. Under these circumstances the Board considers it appropriate to exercise the power conferred on it by Article 111(1) EPC to remit the case to the Opposition Division for the sole purpose of properly adapting the description of the patent in suit to the present claims. When doing so, the Opposition Division should consider in particular whether the amendments made to the claims during the appeal proceedings are adequately reflected throughout the description of the patent in suit.

11.2 The Respondent requested that the case be remitted to the first instance in the case that the patent is not maintained as granted or according to auxiliary request 1, for consideration of the substantive issues of the lower ranking requests, to safeguard its right of all the substantive issues in the case being considered by two instances.

- 11.2.1 Under Article 111(1) EPC, whether the Board itself decides an issue, or whether it refers the matter back to the first instance for decision, is within the discretion of the Board. To have each issue considered and decided by two instances is not a matter as of right for a party. The Boards make use of their discretionary power depending on the merits of each case.
- 11.2.2 In the present case, independent claim 2 of auxiliary request 6 is directed to subject-matter embraced by and specifically claimed in the main request and auxiliary request 1 (cf. point 3.1 above), said subject-matter having been found to not involve an inventive step (cf. point 3.10 above). Therefore, the examination of and decision on auxiliary request 6 involves no fresh issue at all *vis-à-vis* the main request and auxiliary request 1. There is thus no reason for the Board to unduly delay a final decision on auxiliary request 6.
- 11.2.3 Auxiliary request 7 was decided by the Board in the Respondent's favour as regards the substantive issues (cf. points 7 to 9 above), such that he is in a better position than if this request were remitted to the first instance for consideration of these issues.

**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 auxiliary request 7, submitted during the oral proceedings before the Board, and a description yet to be adapted.

The Registrar:

The Chairman:

P. Cremona

R. Freimuth