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**D E C I S I O N**  
**of 8 October 2002**

**Case Number:** T 0406/00 - 3.3.1

**Application Number:** 94110634.6

**Publication Number:** 0626434

**IPC:** C09K 5/04

**Language of the proceedings:** EN

**Title of invention:**

Refrigerant

**Patentee:**

DAIKIN INDUSTRIES, LIMITED

**Opponent:**

- (01) Imperial Chemical Industries PLC  
(02) AUSIMONT S.p.A.

**Headword:**

Refrigerant/DAIKIN

**Relevant legal provisions:**

EPC Art. 56, 123(2)

**Keyword:**

"Main request: inventive step (no) - formulation of the problem vis-à-vis the closest prior art without redundancies - obvious choice within the ambit of closest prior art"  
"Auxiliary request: amendment (not allowable) - purpose of use claim not directly derivable"

**Decisions cited:**

G 0009/91, T 0249/88, T 0789/89, T 0288/92, T 0680/93,  
T 1053/93

**Catchword:**

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Case Number: T 0406/00 - 3.3.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 8 October 2002

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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 3 March 2000  
revoking European patent No. 0 626 434 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** A. J. Nuss

**Members:** R. Freimuth  
J. P. B. Seitz

## Summary of Facts and Submissions

I. The Appellant (Proprietor of the Patent) lodged an appeal on 8 April 2000 against the decision of the Opposition Division posted on 3 March 2000 revoking European patent No. 626 434 which was granted on the basis of two claims, independent claim 1 reading as follows:

"1. Refrigerant composition consisting essentially of pentafluoroethane, 1,1,1,2-tetrafluoroethane and 1,1,1-trifluoroethane."

II. Notice of Opposition had been filed by the Respondents I and II (Opponents I and II), requesting revocation of the patent in its entirety on the ground of lack of inventive step (Article 100(a) EPC). The following documents were submitted *inter alia* in opposition proceedings:

- (1) JP-A-1/092286, considered in the form of its English translation,
- (2) JP-A-63/308085, considered in the form of its English translation,
- (3) Quest for Alternatives, M.O. McLinden and D.O. Didion, ASHRAE Journal, December 1987,
- (5) US-A-4 810 403, and
- (6) EP-A-349 647.

III. The Opposition Division held that the subject-matter claimed did not involve an inventive step. Document (2) was chosen as closest prior art and starting point in the assessment of inventive step since that document

disclosed ternary compositions and gave indications on alternative compounds. Thus, it disclosed refrigerant compositions comprising 1,1,1,2-tetrafluoroethane (R-134a) and a halogenated hydrocarbon having a boiling point of -50 to -35°C. Taking into account the problem underlying the invention, which was to find substitutes for chlorofluorocarbons in order to reduce the impact of such refrigerants onto the ozone layer, the halogenated hydrocarbon to be selected was limited to the choice between pentafluoroethane (R 125) and 1,1,1-trifluoroethane (R-143a) listed in document (2). The other halogenated hydrocarbons listed in that document, i.e. chlorodifluoromethane (R-22), chloropentafluoroethane (R-115) and fluoroethane (R-161), were disregarded by the skilled person as they were either chlorofluorocarbons or toxic (cf. document (3)). Thus, document (2) described a binary refrigerant composition of R-134a and R-125. In view of document (1) describing a refrigerant composition of R-125 and R-143a and document (6) describing a refrigerant composition of R-143a and R-134a all the possible combinations of the three compounds of the refrigerant composition claimed were known in the art. Thus, the skilled person was motivated to incorporate the compounds R-134a, R-125 and R-143a in a refrigerant composition thereby improving the coefficient of performance.

IV. The Appellant defended the maintenance of the patent in suit on the basis on the claims as granted and subsidiarily on the basis of a single amended claim filed as an auxiliary request on 6 February 2002 reading as follows:

"1. Use of a refrigerant composition consisting essentially of R-125, R-134a and R-143a as a substitute for R-22."

At the oral proceedings before the Board held on 8 October 2002 the Appellant started from document (2) as the closest state of the art in the assessment of inventive step. That document disclosed the binary composition of R-125 and R-143a. The problem tackled by the present invention was to provide an alternative refrigerant composition having a good balance of performance which exerted little or no influence on the stratospheric ozone layer when released to the atmosphere and which could be used as a substitute for known refrigerants, such as R-22, which contained chlorine. Document (2) on its own did not teach the addition of R-134a to that binary composition. The combination of document (2) with the teaching of document (5) was mere hindsight in respect of ternary compositions. The Appellant argued that the skilled person could not predict with certainty the success of the envisaged solution, i.e. when providing the ternary mixture of R-134a, R-143a and R-125. Furthermore the ternary compositions of document (5) were different from those claimed since the high boiling component according to that document lacked in the compositions according to claim 1. Thus, document (5) pointed away from the claimed invention.

Having regard to the auxiliary request, the basis for the sole claim 1 was provided by the single example included in the application as filed which directly compared the refrigeration characteristics of the claimed ternary composition with those of R-22 and by the passage at page 1, line 3 to page 2, line 9 of the original description which made it clear that R-22 was an ozone depleting chlorofluorocarbon for which a substitute should be sought.

- V. The Respondent I withdrew his opposition by a letter dated 2 September 2002.

VI. The Respondent II stressed that the closest prior art was document (2) describing refrigerant compositions which could be ternary. The refrigerant compositions comprised R-134a and further halogenated carbons such as R-22, R-115, R-125, R-143a, R-161 and R-22+R-115. In view of the problem underlying the patent in suit of providing compositions having zero ozone depletion potential, R-22 and R-115 were to be disregarded due to the presence of chlorine atoms in those compounds. R-161 being toxic as taught in document (3), solely R-125 and R-143a remained from that list in document (2). Hence, this teaching resulted in an environmentally safe composition comprising R-134a plus R-125 and R-143a, which was the composition claimed, without involving an inventive step.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained either as granted (main request) or in amended form on the basis of the auxiliary request submitted on 6 February 2002.

The Respondent II requested in writing that the appeal be dismissed.

VIII. The decision of the Board was given orally at the end of the oral proceedings in the absence of Respondent I and of Respondent II who, after having been duly summoned, did not attend. After conclusion of the oral proceedings at 10.42 hours, the Respondent II faxed the same day at 10.50 hours an unsigned letter indicating that he apologized for not having informed the Board that he would not attend oral proceedings and that he "hereby unconditionally withdraw from the Appeal filed by Ausimont S.p.A."

## Reasons for the Decision

1. The appeal is admissible.
2. *Parties to the appeal*
  - 2.1 The Respondent I's withdrawal of his opposition (see point V above) is to be treated as a withdrawal of all his pending requests and as a withdrawal from the appeal proceedings. Thus, he ceases to be a party to appeal proceedings as far as the substantive issues are concerned (see decision T 789/89, OJ EPO 1994, 482, points 2.3 and 2.6 of the reasons).
  - 2.2 The Respondent's II letter faxed on the day of the oral proceedings was neither signed nor was his declaration to "withdraw from the Appeal filed by Ausimont S.p.A." consistent with his position as a non-appealing respondent. Regardless of those deficiencies that letter, however, reached the EPO and the Board only after the final decision of the Board had been announced and the oral proceedings closed, thus the decision finding process having been concluded. Thus, the Respondent's II declaration to "withdraw from the Appeal" was too late to affect his status in the appeal proceedings and to be taken into account in the Board's decision. The Respondent II, hence, remains a party to the present appeal.

On these matters, the Board points to the obligation that parties invited to attend oral proceedings must inform the EPO as early as possible if they are unable to attend (Guidance for parties to appeal proceedings and their representatives, OJ EPO 1996, 342, point 3.5.2), an obligation which does not appear to have been complied with properly in the present case.



*Main request*

3. *Inventive step*

3.1 The patent in suit relates to a ternary composition of the halogenated hydrocarbons R-125, R-134a and R-143a to be used as refrigerant (patent specification column 1, line 3). Similar compositions for the same use already belong to the state of the art: document (2) refers to compositions of R-134a and a halogenated hydrocarbon having a boiling point of -50 to -35°C which are used as refrigerants (page 2, paragraphs 4 and 7). The halogenated hydrocarbons may be used as mixtures of one or more of them (page 3, paragraph 3, lines 21 and 22), a ternary composition being exemplified. The suitable halogenated hydrocarbons listed in that document are R-22, R-115, R-125, R-143a, R-161 and the azeotrope of R-22 / R-115 (page 3, penultimate line to page 4, line 2), a chlorine-free refrigerant composition of R-134a and R-125 being specifically described.

The Board considers, in agreement with the Appellant, the Respondent II and the Opposition Division, that this disclosure of document (2) represents the closest state of the art, and, hence, is to be taken as the starting point in the assessment of inventive step.

3.2 The drawbacks of conventional chlorofluorinated refrigerant compositions lie in depleting the stratospheric ozone layer when released to the atmosphere, thereby inflicting a serious adverse influence on the ecosystem (patent specification column 1, lines 6 to 15).

The Appellant submitted at the oral proceedings before the Board that the problem underlying the invention should be formulated as to provide an alternative

refrigerant composition having a good balance of performance which exerted little or no influence on the stratospheric ozone layer when released to the atmosphere and which could be used as a substitute for known refrigerants, such as R-22, which contained chlorine.

However, the Appellant's formulation of the problem comprises redundant elements which in fact do not contribute to the problem *per se* and it comprises elements which ignore the actual teaching of the closest prior art. Thus, the objective of providing a refrigerant composition "which could be used as a substitute for known refrigerants" is superfluous since it is already reflected in the adjective "alternative" specifying the refrigerant composition to be provided. The same conclusion applies to the term "such as R-22" which merely gives an example of a known refrigerant which does not add anything to the problem as such. Furthermore, the implication that the known refrigerants to be substituted necessarily "contained chlorine" misses the fact that the closest prior art (2) already describes chlorine-free refrigerant compositions.

Thus, the objective problem underlying the patent in suit vis-à-vis the closest prior art document (2), as submitted by the Respondent II, comes down to providing an alternative refrigerant composition having a good balance of performance which exerts little or no influence on the stratospheric ozone layer when released to the atmosphere.

- 3.3 As the solution to this problem, the patent in suit proposes a composition consisting essentially of R-134a, R-143a and R-125.

3.4 Neither Respondent ever disputed that the claimed refrigerant composition achieves ozone friendliness; and the Board is not aware of any reason for challenging this finding. The compositions of the invention are readily decomposed in the atmosphere since they contain neither chlorine nor bromine atoms which adversely affect the ozone layer; hence, they do not give rise to the depletion of the ozone layer (patent specification column 2, lines 50 to 53). For these reasons, the Board is satisfied that the problem underlying the patent in suit has been successfully solved.

3.5 Finally, it remains to be decided whether or not the proposed solution to the problem underlying the patent in suit is obvious in view of the cited state of the art.

3.5.1 When starting from the refrigerant compositions known from document (2), i.e. comprising in particular R-134a and a mixture of one or more halogenated hydrocarbon(s) selected from R-22, R-115, R-125, R-143a, R-161 and R-22 / R-115, it is a matter of course that the person skilled in the art, seeking to provide ozone friendly refrigerant compositions, would turn his attention to that prior art in the field of refrigerants just addressing that technical problem. He would take document (5) into consideration, which aims at refrigerant compositions having reduced ozone depletion potential (column 1, lines 42 and 43). He would be struck in particular by that document since it specifies in the table on columns 3 and 4 the ozone depletion potential of individual refrigerants.

That table in document (5) indicates on the one hand that the refrigerant R-134a of the closest document (2) has zero ozone depletion potential (column 4, line 6) and on the other that out of that list of halogenated

hydrocarbons in document (2) exclusively R-125 and R-143a show zero ozone depletion potential as well (column 3, lines 64 and 65). The further halogenated hydrocarbons R-22 and R-115 of that list in document (2) are taught in document (5) to have an ozone depletion potential, namely of 0.05 and 0.3 (column 3, lines 66 and 68). The last halogenated hydrocarbon of that list in document (2), R-161, is anyway to be disregarded for its high toxicity (document (3), page 76, figure 6).

The Board concludes from the above that document (5) gives the person skilled in the art a concrete hint on how to solve the problem underlying the patent in suit to provide ozone friendly refrigerant compositions (cf. point 3.2 *supra*), namely by retaining the sole ozone friendly refrigerants R-125 and R-143a indicated in that list of halogenated hydrocarbons in document (2). Since mixtures thereof are addressed in document (2), the teaching of document (5) gives a clear incentive to generate ozone friendly refrigerant compositions within the ambit of the closest prior art document (2) which comprise the ozone friendly refrigerant R-134a and a mixture of R-125 and R-143a, thereby arriving naturally at the claimed compositions, i.e. the solution proposed by the patent in suit. In the Board's judgement, it was obvious to try to follow the avenue indicated in the state of the art with a reasonable expectation of success without involving any inventive ingenuity.

3.6 For the following reasons the Board cannot accept the Appellant's arguments designed to support inventive step.

3.6.1 The Appellant argued that the skilled person could not predict with certainty the success of the envisaged solution, i.e. when providing the ternary mixture of R-134a, R-143a and R-125.

However, when assessing inventive step it is not necessary to establish that the success of an envisaged solution of a technical problem was predictable with certainty. In order to render a solution obvious it is sufficient to establish that the skilled person would have followed the teaching of the prior art with a reasonable expectation of success (see decisions T 249/88, point 8 of the reasons; T 1053/93, point 5.14 of the reasons; neither published in OJ EPO).

In the present case, the Board cannot agree with the Appellant's argument that due to some uncertainty about the predictability of success the skilled person would not have contemplated the ternary mixture claimed in order to achieve ozone friendly refrigerant compositions. The skilled person has a clear incentive from document (5) to do so (see point 3.5 above). 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. As there could be no doubt about the suitability of said ternary mixture in respect of its ozone friendliness, it was not even necessary for him to confirm this finding experimentally. Consequently, he would arrive at the claimed invention without inventive ingenuity.

- 3.6.2 The Appellant submitted that document (5) pointed away from the claimed invention since the ternary compositions of document (5) were different from those claimed.

However, the compositions claimed in document (5) are not relevant for objecting to the inventive step of the claimed invention (cf. point 3.5 *supra*). It is rather the simple but highly relevant teaching about the specific ozone depletion potential of individual refrigerants in that document which gives the skilled

person guidance for solving the problem underlying the invention and which, in combination with the closest prior document (2), results in the conclusion of obviousness. Thus, the Appellant's argument cannot convince the Board.

3.7 Therefore, in the Board's judgement, the subject-matter of claim 1 represents an obvious solution to the problem underlying the patent in suit and does not involve an inventive step.

4. As a result, the Appellant's main request is not allowable as the subject-matter of claim 1 lacks inventive step pursuant to Article 56 EPC.

*Auxiliary request*

5. *Amendments (Article 123(2) EPC)*

5.1 The Appellant has amended claim 1 in the course of appeal proceedings (see point IV above). In case of such amendments, they must be fully examined by the Board as to their compatibility with the requirements of the EPC, in particular with the provisions of Article 123 EPC (see decision G 9/91, *loc cit.*, point 19 of the reasons).

5.2 In order to determine whether or not an amendment offends against Article 123(2) EPC it has to be examined whether technical information has been introduced which a skilled person would not have objectively and unambiguously derived from the application as filed (see decisions T 288/92, point 3.1 of the reasons; T 680/93, point 2 of the reasons; neither published in OJ EPO).

5.3 The fresh amendment made by the Appellant to claim 1 as granted amounts to a change of category, i.e. the switch from a product claim directed to the refrigerant composition *per se* to a use claim directed to the use of that composition "as a substitute for R-22".

5.3.1 The Appellant argued that the basis for that fresh feature was provided by the single example included in the application as filed which directly compared the refrigeration characteristics of the claimed composition with those of R-22.

It is true that Example 1 of the application as filed specifies the coefficient of performance and the refrigerating capacity of the refrigerant R-22. However, Example 1 is not a single one but merely one out of ten examples and that example merely states these characteristics of R-22 without making any comparison or direct link between R-22 and the refrigerant composition of claim 1. Regardless of these inconsistencies of the Appellant's allegation with the facts, the cited example is completely silent about the purpose of the refrigerant composition as defined in claim 1 to function "as a substitute for R-22".

5.3.2 Furthermore, the Appellant argued that the passage at page 1, line 3 to page 2, line 9 of the original description supported that amendment since it made clear that R-22 was an ozone depleting chlorofluorocarbon for which a substitute should be sought.

While R-22 is in fact indicated in an exemplary list of conventional working fluids for refrigerators (page 1, line 8), the passage addressed by the Appellant, however, acknowledges merely the state of the art in a general way. Thus, that section of the application as

filed is confined to the prior art and does not address the purpose claimed that the refrigerant composition as defined in claim 1 functions "as a substitute for R-22".

5.3.3 On the invitation of the Board during oral proceedings, the Appellant submitted that no further section of the application as filed backed up that amendment. The Board, on its own motion, could also not discover any additional information in the application as filed supporting it.

5.4 Therefore, in the Board's judgement, the result of the amendment to claim 1 as granted is that the skilled man is presented with information which is not directly and unambiguously derivable from the application as filed.

5.5 The Board concludes that claim 1 as amended extends the subject-matter claimed beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC. In these circumstances, the Appellant's auxiliary request is not allowable and must be rejected as well.

## **Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

N. Maslin

A. Nuss