

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 11 October 2022**

Case Number: T 0322/19 - 3.3.10

Application Number: 10799241.4

Publication Number: 2516578

IPC: C09K5/04

Language of the proceedings: EN

Title of invention:

COMPOSITIONS COMPRISING TETRAFLUOROPROPENE AND DIFLUOROMETHANE
AND USES THEREOF

Patent Proprietor:

The Chemours Company FC, LLC

Opponent:

ARKEMA France

Headword:

Relevant legal provisions:

EPC Art. 100(a), 56

Keyword:

Inventive step - (no)

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0322/19 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 11 October 2022

Appellant: The Chemours Company FC, LLC
(Patent Proprietor) 1007 Market Street
Wilmington DE 19801 (US)

Representative: Dannenberger, Oliver Andre
Abitz & Partner
Patentanwälte mbB
Postfach 86 01 09
81628 München (DE)

Respondent: ARKEMA France
(Opponent) 420 Rue d'Estienne d'Orves
92700 Colombes (FR)

Representative: Arkema Patent
Arkema France
DRD-DPI
420, rue d'Estienne d'Orves
92705 Colombes Cedex (FR)

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 29 November
2018 revoking European patent No. 2516578
pursuant to Article 101(3) (b) EPC.**

Composition of the Board:

Chair P. Gryczka
Members: R. Pérez Carlón
L. Basterreix

Summary of Facts and Submissions

- I. The appellant (patent proprietor) lodged an appeal against the opposition division's decision to revoke European patent No. 2 516 578.
- II. Notice of opposition had been filed on grounds including lack of inventive step (Article 100(a) EPC).
- III. The documents filed during the opposition proceedings include the following:
- D1 WO 2010/059677
D2 WO 2010/061084
D14 Chapter 6.1: Refrigerants. Refrigeration systems for HVAC, 1997 The McGraw-Hill Companies, retrieved from www.knovel.com.
- IV. Claims 1 and 2 of the patent as granted, which is the appellant's main request, read as follows:
- "1. Use of a composition comprising about 78.5 weight percent 2,3,3,3-tetrafluoropropene and about 21.5 weight percent difluoromethane in an automotive heat pump.*
- 2. Use as in claim 1 wherein said heat pump is designed to use 1,1,1,2-tetrafluoroethane."*
- V. The compounds mentioned in claims 1 and 2 are referred to as follows:
- | | |
|-------------|----------------------------|
| HFCO-1234yf | 2,3,3,3-tetrafluoropropene |
| HFC-32 | difluoromethane |
| HFC-134a | 1,1,1,2-tetrafluoroethane |

- VI. The opposition division concluded that the priority date could not be acknowledged for the claimed subject-matter, meaning that D1 and D2 were prior art as defined in Article 54(2) EPC. The claimed invention was not inventive in view of D2, which was the closest prior art, in combination with D1.
- VII. The appellant's auxiliary requests were filed with a letter dated 19 November 2020. Claim 1 of all the auxiliary requests corresponds either to claim 1 or to claim 2 of the patent as granted.
- VIII. The arguments by the appellant, where relevant to the present decision, were as follows.

D14 was filed late without providing reasons why it had not been filed earlier. D14 was thus not to be admitted into the proceedings.

The right to priority was validly claimed. The priority document disclosed the composition required by claim 1 in Tables 2, 5 and 6. Page 1, lines 24-25, referred to the regulations for mobile air conditioning and page 3, line 6, referred to the passenger compartment of an automobile requiring air conditioning.

If the priority were not validly claimed, document D2 would have been the closest prior art. The problem underlying the claimed invention was to provide a composition with improved properties suitable as a replacement for HFC-134a in automotive heat pumps. The claimed solution was the use according to claim 1, characterised in that it required about 78.5 weight percent of HFO-1234yf and about 21.5 weight percent HFC-32. This technical problem was credibly solved in view of the experimental data provided with the grounds

of appeal. The skilled person would not have considered the disclosure of D1 in connection with automotive heat pumps, as D1 related to stationary refrigeration. The claimed solution was thus inventive.

- IX. The arguments by the respondent (opponent), where relevant to the present decision, were as follows.

The experimental evidence filed by the appellant with the statement of grounds of appeal should have been filed earlier and was thus not to be admitted into the proceedings.

The right to priority was not validly claimed, as the priority document did not disclose the use of the required composition in automotive heat pumps. D1 and D2 were thus prior art for examining inventive step.

D2 was the closest prior art. It disclosed HFO-1234yf and its compositions with HFC-32 as a replacement for HFC-134a in automobile heating and air conditioning. If the problem of providing an improved composition for that purpose were considered to be solved, the claimed solution would not have been inventive in view of the physical properties of the composition disclosed in D1.

- X. The board informed the parties in a communication in preparation for oral proceedings that it was inclined to consider admissible both D14 and the experimental evidence filed by the appellant in its statement of grounds of appeal. The board was further inclined to agree with the opposition division on the issues of the right to priority and inventive step.

- XI. Oral proceedings before the board of appeal took place on 11 October 2022. At the board's initiative and at

short notice, the venue was changed to a videoconference. None of the parties disagreed.

XII. The parties' final requests were as follows:

- The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request), or that the patent be maintained with the claims of auxiliary requests 1 to 8, filed with the letter dated 19 November 2020.
- The respondent requested that the appeal be dismissed.

XIII. At the end of the oral proceedings, the decision was announced.

Reasons for the Decision

1. The appeal is admissible.
2. Admissibility of the experimental data in the statement of grounds of appeal
 - 2.1 The respondent requested that this evidence not be admitted. It argued that the issue of whether there was an effect over the disclosure of D2 had been an issue from the onset of the opposition proceedings. This evidence should thus have been provided earlier.
 - 2.2 According to Article 12(4) RPBA 2007, everything presented by the parties with their notice of appeal and reply must be taken into account by the board. The board may nevertheless hold inadmissible evidence which could have been presented before the opposition

division.

- 2.3 During opposition proceedings, the appellant relied on Example 1 of the patent to prove an improvement over D2. In the decision under appeal the opposition division provided reasons why these data did not represent the compositions in D2 and thus could not demonstrate that effect. The experimental data filed with the grounds of appeal is thus a response to this reasoning. In view of that sequence of events, the board saw no reason to hold this data inadmissible.

3. Admissibility of D14

- 3.1 Document D14 was filed by the respondent with its reply to the grounds of appeal. Its admission is governed by Article 12(4) RPBA 2007.
- 3.2 D14 is part of a textbook and provides proof of the common general knowledge before the filing date. The board sees no reason to hold this type of evidence inadmissible.
- 3.3 In addition, D14 is arguably a response to the experimental data filed by the appellant in its grounds of appeal. For this reason too, the board admitted D14 into the proceedings.

4. Right to priority

- 4.1 The opposition division concluded that the right to priority had not been validly claimed.

It was not disputed that Tables 2, 5 and 6 of the priority document disclosed the composition required by claim 1.

The question of the validity of the priority hinges on whether that composition was disclosed in the context of an automotive heat pump.

- 4.2 The appellant argued that the priority document related to heat pump systems (page 1, line 7) and compositions for that use (page 1, line 8). All the compositions disclosed in the priority document were defined as heat transfer fluids (page 1, line 10).

The composition required by claim 1 was tested with respect to heating performance under typical heat pump conditions (Example 2, Table 2) and refrigeration (Example 5, Table 5). The skilled person would thus conclude that this composition was useful as a heat transfer composition for cooling and heating.

Lastly, the priority document disclosed, in the context of heat transfer, a passenger compartment of an automobile on page 3, lines 1-6. Page 1, lines 24-25, referred to regulations for refrigerants in automobile air conditioning.

- 4.3 The priority document discloses a number of compositions as a replacement for R410A, R404A and R407C, but does not relate to replacing HFC-134a, which was the refrigerant of choice in the context of automotive heat pumps (D2, page 1, lines 24-25).

Example 2 in the priority document provides the performance of the required composition "at typical heat pump conditions"; however, by the appellant's own argument there is a big difference between the requirements of automotive heat pumps and their stationary equivalent. Therefore, the feature "heat

pump" in Example 2 does not inevitably disclose such a device in the automotive field.

Lastly, the passage on page 2, line 30 to page 3, line 6, discloses that a heat transfer composition carries heat from a heat source to a heat sink. A number of heat sources are listed, including "the passenger compartment of an automobile requiring air conditioning". This would at most relate to air conditioning (cooling) but not to the reverse (heating), which is also an integral part of a heat pump. Therefore, even if the composition in the examples were to be combined with this passage, it would not disclose its use in a heat pump.

In summary, the priority document does not disclose the feature "automobile heat pump", let alone in combination with the composition required by claim 1, or as a replacement for HFC-134a, as required by claim 2.

4.4 As the right to priority has not been validly claimed for claims 1 and 2 of the patent as granted, documents D1 and D2, published before the patent was filed, are prior art as defined in Article 54(2) EPC for examining inventive step.

5. Inventive step

5.1 The claimed invention relates to the use of a composition comprising about 78.5 weight percent HFO-1234yf and about 21.5 weight percent HFC-32 in an automotive heat pump. Claim 2 further requires the heat pump to be designed to use HFC-134a.

5.2 Closest prior art

The opposition division and the parties considered that document D2 was the closest prior art. In the same way as the claimed invention, it relates to refrigerants for automobile heat pumps. It does not disclose a composition having 78.5 weight percent HFO-1234yf and 21.5 weight percent HFC-32.

The appellant argued that inventive step should be examined with respect to its most preferred embodiment, which was replacing HFC-134a with pure HFO-1234yf.

For the reasons below, the board's conclusion is negative even over this embodiment. There is thus no need to elaborate on whether another embodiment of D2 could come even closer to the claimed invention.

5.3 Technical problem underlying the invention

The appellant defined the problem underlying the claimed invention as that of providing a replacement for HFC-134a in automotive heat pumps having enhanced properties.

5.4 Solution

The solution to this technical problem is the claimed use, characterised in that it requires a composition comprising 78.5 weight percent HFO-1234yf and 21.5 weight percent HFC-32.

5.5 Success

Document D1 provides sufficient evidence that the composition required by claim 1 improves the

performance of HFO-1234yf as a replacement for HFC-134a. The problem as formulated by the appellant is thus credibly solved by the claimed use.

- 5.6 It thus remains to be decided whether the proposed solution to the above-defined objective problem would have been obvious to the skilled person in view of the prior art.
- 5.6.1 Document D2 taught binary mixtures of HFO-1234yf and HFC-32 as suitable alternatives to HFO-1234yf for replacing HFC-134a in automobile heat pumps.
- 5.6.2 In the same way as the patent, both D1 and D2 consider COP (coefficient of performance) and CAP (capacity) as the parameters of choice for evaluating the performance of refrigerants.
- 5.6.3 It was undisputed that the European F-Gas regulation limited the GWP (global warming potential) of refrigerants in automobile heat pumps to 150 (paragraph [0037] of the patent).
- 5.6.4 Document D1 discloses CAP and COP of compositions, including that required by claim 1, under different heating and cooling conditions (Examples 2 and 5 to 8). Example 4 discloses the GWP of a number of refrigerant compounds and compositions.

These examples in D1 demonstrate the following:

- All the binary mixtures of HFO-1234yf and HFC-32 have higher CAP than either HFC-134a or pure HFO-1234yf.

- Within the binary mixtures of HFO-1234yf and HFC-32
 - CAP increases with the relative amount of HFC-32,
 - GWP increases with the relative amount of HFC-32,
 - COP remains almost constant.
- The composition required by claim 1 has a GWP of 148.

5.6.5 When seeking an improved replacement for HFC-134a in automobile heat pumps, the skilled person would have chosen binary mixtures of HFO-1234yf and HFC-32 in view of the high CAP and low GWP taught by D1.

Within said binary mixtures, the skilled person would have maximised the relative amount of HFC-32 in order to enhance CAP. The European F-Gas regulation sets the higher limit of HFC-32 by limiting the GWP of refrigerants for automobile heat pumps to 150. By doing so, said person would thus have arrived at the composition required by claim 1 without exercising inventive skill.

5.6.6 The appellant argued that the skilled person would not have combined the teaching of D2 and D1, as they had different objectives. D1 related to stationary heat transfer systems; an automobile heat pump was a substantially different system, with different requirements which included a higher CAP.

However, D2 explicitly discloses HFC-134a as the refrigerant of choice in automobile heat pumps on the filing date of the patent (page 1, lines 24-25). It is thus known from D2 that a replacement for this refrigerant is in principle suitable for the use in claim 1.

D1, in turn, also relates to replacing HFC-134a. It is not only indicated among the numerous refrigerants to be replaced on page 31, antepenultimate line, but is explicitly addressed in the examples. Example 5, in the context of cooling performance, concludes that "several compositions have capacity greater than the capacity of HFC-134a". D1 thus has the same objective as D2.

In addition, the performance of the composition required by claim 1 derives from its properties, in particular its CAP and COP. The mere knowledge of the properties of the composition in the context of heat transfer should have been a clear pointer to the skilled person, regardless of the specific type of heat transfer device.

- 5.6.7 The appellant also argued that the examples in D1 did not represent typical automotive heat pump conditions. For this reason too, the skilled person would not have combined the disclosure of D1 with that of the closest prior art.

The issue is, however, that the properties sought, in particular CAP, exhibit a trend regardless of the conditions tested. D1 provides examples of cooling (Example 5) and heating (Example 7); in both cases CAP increases with the relative amount of HFC-134a. The lack of a test disclosing the exact conditions required in an automotive heat pump is thus not relevant.

- 5.6.8 The appellant further argued that it was known from D1 that the composition required by claim 1 had a large temperature glide. This was an undesired property. For that reason, the skilled person would not have considered using this composition in the context of

heat pumps.

If the appellant's argument were to be convincing, this composition could not be an improvement over HFO-1234yf and might even need to be considered unsuitable for the claimed use. As the board decided to follow the appellant's view that the problem as defined in point 5.3 was credibly solved, this argument must be rejected.

- 5.6.9 The appellant argued that, according to the first paragraph on page 47 of D1, the preferred compositions had 15 weight percent HFC-32 or less. The teaching of D1 thus led away from the claimed invention.

However, the cited passage discloses that compositions having 15 weight percent HFC-32 or less come close to the glide of R407C. On the one hand, it does not refer to HFC-134a, and on the other it relates to temperature glide and not to the properties considered essential for the claimed use.

- 5.6.10 The appellant also argued that the skilled person would have no reason to seek a mixture with a higher GWP.

However, the composition required by claim 1 has an enhanced CAP and a GWP at the upper end of the boundary set by the European legislator. The skilled person would thus have had every reason to choose that composition. This argument fails to convince the board.

- 5.7 For these reasons, the use of claim 1 is not inventive within the meaning of Article 56 EPC. The ground of opposition pursuant to Article 100(a) EPC thus precludes the maintenance of the patent as granted.

5.8 It was not disputed that the arguments applied in the same manner to claim 2. The closest prior-art document, D2, relates to replacing HFC-134a; no additional difference is thus introduced by the features of claim 2 over and above those of claim 1. The arguments with respect to inventive step do not differ.

5.9 As claim 1 of all the auxiliary requests on file corresponds either to claim 1 or to claim 2 of the patent as granted, their subject-matter also lacks an inventive step. None of the auxiliary requests is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



C. Rodríguez Rodríguez

P. Gryczka

Decision electronically authenticated