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**Datasheet for the decision  
of 18 June 2024**

**Case Number:** T 2036/22 - 3.3.02

**Application Number:** 15788311.7

**Publication Number:** 3023472

**IPC:** C09K5/04

**Language of the proceedings:** EN

**Title of invention:**  
COMPOSITION CONTAINING HFC AND HFO

**Patent Proprietor:**  
Daikin Industries, Ltd.

**Opponents:**  
The Chemours Company FC, LLC  
ARKEMA FRANCE  
Mexichem Fluor S.A. de C.V.

**Headword:**  
HFC Composition / DAIKIN

**Relevant legal provisions:**  
EPC Art. 56  
RPBA 2020 Art. 12(4), 12(6), 13(1), 13(2)

**Keyword:**

Inventive step - (no)

Decision of the opposition division to admit evidence -  
overturned (no)

Evidence filed in appeal - admitted (no)

Submissions at the oral proceedings - admitted (no)

**Decisions cited:**

G 0007/93, T 0547/88, T 0960/15, T 0291/21

**Catchword:**



**Beschwerdekammern**

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**Chambres de recours**

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**Case Number:** T 2036/22 - 3.3.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.02**  
**of 18 June 2024**

**Appellant:** Daikin Industries, Ltd.  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 5 July 2022  
revoking European patent No. 3023472 pursuant to  
Article 101(3) (b) EPC**

**Composition of the Board:**

**Chairman** M. O. Müller  
**Members:** M. Maremonti  
M. Blasi

## Summary of Facts and Submissions

I. The appeal by the patent proprietor ("appellant") lies from the decision of the opposition division to revoke European patent No. 3 023 472 ("the patent").

II. Three oppositions were filed under Article 100(a) and (c) EPC. Reference was made, *inter alia*, to the following documents:

D1: WO 2010/059677 A2

D18: EP 2 271 724 B1

D19: WO 2012/067980 A2

D20: US 5,210,342

D26: WO 2013/119919 A1

D27: US 2014/0018582 A1

D41: Experimental report by A. A. Polycarpou dated 20 April 2022

D23/D42: Decision T 2172/16

III. In reply to the notices of opposition, the appellant filed on 22 February 2021 a set of claims of a main request. The appealed decision is based on this request, claim 1 of which reads as follows:

"1. A composition, comprising

(1) HFO-1234yf and optionally HFO-1234ze;

(2) HFC-32, and

(3) HCC-40, HCFC-22 and 3,3,3-trifluoropropyne,

wherein the total amount of (1) and (2) is  $\geq 95$  mass%, based on the total amount of (1)-(3)."

- IV. The opposition division came to the following conclusion, *inter alia*:
- D41 was admitted into the proceedings.
  - The subject-matter of claim 1 of the main request did not involve an inventive step in view of D1 taken as the closest prior art.
- V. By letter dated 6 October 2022, opponent 1 withdrew its opposition. Therefore, opponent 1 is not party to the appeal proceedings.
- VI. The appellant contested the reasoning of the opposition division and argued, *inter alia*, that the subject-matter of claim 1 of the main request involved an inventive step. The appellant also filed a set of claims of auxiliary request 1. Its arguments were corroborated by the following new items of evidence (which it labelled as D43 to D48):
- A043: Experimental Report
  - A044: The Montreal Protocol on Substances that Deplete the Ozone Layer, pages 1/3 to 3/3
  - A045: Part 4: Environmental Hazards, Chapters 4.1 and 4.2, United Nations, 2013, pages 219 to 246
  - A046: Report of the Industry's Informal Correspondence Group on Preventing the Use of Counterfeit Refrigerants, June 2013, pages 1 to 19
  - A047: Decision of the opposition division on EP 2 938 695 dated 23 December 2021
  - A048: Experimental Report
- VII. Opponents 2 and 3 ("respondent-opponents 2 and 3" or "respondents") rebutted the arguments of the appellant and submitted, *inter alia*, that the subject-matter of claim 1 of the main request lacked an inventive step.

They also contested, *inter alia*, the admittance of A043 and A048. In support of its arguments, respondent-opponent 3 filed the following new item of evidence, which it labelled as D49 (new document numbering introduced by the board):

A049: Wasim Akran *et al.*, "*Lubricity of environmentally friendly HFO-1234yf refrigerant*"; Tribology International, Vol. 57, 2013, pages 92 to 100

VIII. The parties were summoned to oral proceedings as per their requests. In preparation for the oral proceedings, the board issued a communication under Article 15(1) RPBA. In this communication, the board expressed, *inter alia*, the preliminary opinion that documents D41 and D42 were part of the appeal proceedings and that documents A043 and A048 should not be admitted. The board further noted that the amendments made in claim 1 of auxiliary request 1 did not appear to change the claimed scope as compared with claim 1 of the main request.

IX. Oral proceedings before the board were held on 18 June 2024 by videoconference in the presence of all parties. During the oral proceedings, the appellant asserted, *inter alia*, that the film formation described in document D41 was disadvantageous in refrigeration systems and argued that one formulation of the objective technical problem might be as the provision of a composition with improved lubricating performance, without disadvantageous film formation. This submission by the appellant was not admitted (see below).

X. Final requests relevant to the decision

The appellant requested that the appealed decision be set aside and that the patent be maintained in amended form on the basis of the claims of the main request underlying the appealed decision and a correspondingly

adapted description, or, alternatively, that the patent be maintained in amended form on the basis of the claims of auxiliary request 1 filed with the statement of grounds of appeal and a correspondingly adapted description. The appellant further requested that documents D41 and D42 not be admitted into the proceedings and that documents A043 and A048 be admitted.

The respondents requested that the appeal be dismissed, meaning that revocation of the patent be confirmed. They further requested that documents A043 and A048 not be admitted into the proceedings. Respondent-opponent 3 additionally requested that document A049 be admitted into the proceedings.

XI. As regards the parties' submissions that are relevant to the decision, reference is made to the reasons for the decision set out below.

### **Reasons for the Decision**

Documents D41, D42, A043, A048 and A049 - admittance into the proceedings

1. Document D41

1.1 D41 is an experimental report filed by opponent 1 by letter dated 25 April 2022, i.e. in advance of the final date (28 April 2022) for making written submissions before the oral proceedings set by the opposition division under Rule 116 EPC. This document was filed by opponent 1 in the context of inventive step. It contains data used by opponent 1 to show that the effect relied upon by the appellant was not achieved across the whole claimed scope.



1.2 The appellant requested that D41 not be admitted, referring to decision T 960/15. However, D41 had been admitted by the opposition division (appealed decision, point 3 on page 3). Therefore, the appellant's request amounts to a request for exclusion of D41 from the appeal proceedings.

1.3 According to the appellant, the filing of D41 could be seen as a reaction to the main request filed with the reply to the notices of opposition. However, this reply had been filed on 22 February 2021, i.e. more than one year before the filing of D41, which occurred only two months in advance of the oral proceedings. Therefore, D41 was filed late. The appellant argued that, in view of the short time remaining until oral proceedings, D41 should not have been admitted. Even assuming that admittance of D41 was justified, oral proceedings should have been postponed to give the appellant sufficient time to analyse the results of D41 and prepare a proper response. Indeed such procedural handling had been adopted by the opposition division in parallel opposition cases on divisional applications of the patent. In those cases, opponent's experimental data were only admitted on condition that the oral proceedings were postponed. However, such a postponement request was not granted by the opposition division in the case at hand. Therefore, the appellant's right to be heard was violated.

Additionally, the opposition division erred in considering D41 as *prima facie* relevant. The experiments carried out in D41 did not constitute a proper repeat of the examples of the patent. Instead, operating conditions which significantly deviated from those taught in the patent were chosen.

1.4 The board has doubts as to whether, by way of criticising the opposition division's procedural handling of D41, a piece of documentary evidence which was admitted into the proceedings by the opposition division and taken into consideration in substance in the decision under appeal could actually be excluded from the proceedings by the board (for further considerations in this respect, see Article 114(1), Rule 81(1), Rule 84(2) EPC). The approach that on appeal, such an exclusion of evidence admitted or introduced into the proceedings by the opposition division is generally not possible implies that a patent proprietor's legal position in relation to such a new piece of evidence presented during opposition proceedings is that it is to be given, during opposition proceedings, an adequate opportunity to respond to that new evidence (see Article 113(1), Rule 81(3) EPC). Decision T 960/15 referred to by the appellant in support of its request to exclude D41 is of no assistance since the document at issue in case T 960/15 was not actually excluded from the proceedings by the competent board.

1.5 This matter of excluding evidence admitted and considered by the opposition division does not need to be further addressed in the circumstances of the present case, however, since the board had no reason to overturn the opposition division's decision on admittance of D41, for the following reasons.

1.5.1 According to established case law of the boards of appeal developed in view of decision G 7/93 (OJ EPO 1994, 775, reasons 2.6), if an opposition division is required under the EPC to exercise its discretion in certain circumstances, it should have a certain degree of freedom when exercising that discretion, without interference from boards of appeal.

Accordingly, it is not within the remit of the board to re-examine a case and to decide whether it would have exercised the discretion in the same way. A board should only overrule the way in which an opposition division exercised its discretion if the board concludes that the opposition division has done so according to the wrong principles, or without taking into account the right principles, or in an unreasonable way.

- 1.5.2 Even assuming that D41 could and should have been filed earlier, and thus that it was filed late, according to the Guidelines for Examination, E-VI.2 (the edition of March 2022, i.e. the version applicable at the time the decision under appeal was taken), *prima facie* relevance is the main criterion to be applied by an opposition division when deciding on the admittance of late-filed evidence.
- 1.5.3 According to the appealed decision (point 3 on page 3), after examining the content of D41, the opposition division concluded that this document was highly relevant to inventive step and decided to admit it into the proceedings. Therefore, the opposition division applied the right criterion when deciding on the admittance of D41. Moreover, there is no reason to conclude that the opposition division used the available criterion in an unreasonable way. No arguments in this sense have been submitted by the appellant either.
- 1.5.4 In the statement of grounds of appeal, the appellant submitted that it would have been necessary to allow it sufficient time, in opposition proceedings, to analyse the experiments reported in D41 and respond thereto. The admittance of D41 by the opposition division without an opportunity for the appellant to

appropriately react thus amounted to a violation of its right to be heard (Article 113(1) EPC).

1.5.5 However, as regards the right of the appellant to be heard on D41, no request for postponement of the oral proceedings is found, either in any letter submitted by the appellant after D41 had been filed or in the minutes of the oral proceedings before the opposition division. On the contrary, the appellant discussed the content of D41 in the oral proceedings - see page 2 of the minutes, first full paragraph. After this discussion and the announcement of the admittance of D41, the appellant stated in the oral proceedings before the opposition division that no additional request would be filed. There is thus no indication that the appellant did not have adequate opportunity to react to D41 in opposition proceedings.

1.5.6 Hence, the board concluded that the appellant's right to be heard as regards D41 had not been violated. There was, therefore, also no reason for the board to consider, within the context of Article 11 RPBA, whether a violation of the appellant's right to be heard associated with the admittance of D41 could indeed have resulted in exclusion of D41 from the proceedings, or whether such a violation associated with the admittance of D41 would, instead, have resulted in this violation being remedied through remittal of the case to the opposition division to ensure that the appellant was provided with an adequate opportunity to comment on the admitted document D41.

1.6 For these reasons, D41 is part of the appeal proceedings.

2. Document D42

2.1 D42 is the decision of the board of appeal in case T 2172/16 filed by respondent-opponent 3 by letter dated 27 April 2022, i.e. in advance of the final date (28 April 2022) for making written submissions before the oral proceedings set by the opposition division under Rule 116 EPC.

2.2 No decision on the admittance of D42 had been taken by the opposition division. The appellant requested that D42 not be admitted because it was filed late and was not relevant to the case at hand.

2.3 However, the board notes that D42 had already been filed as document D23 by respondent-opponent 2 with its notice of opposition. As a consequence, D42/D23 was admissibly raised in opposition proceedings and thus the board has no discretion as regards document D42 under Article 12(4) RPBA.

Therefore, D42 is part of the appeal proceedings.

3. Document A043

3.1 Document A043 is an experimental report first filed by the appellant with the statement of grounds of appeal in the context of inventive step. The respondents requested that A043 not be admitted.

3.2 According to the appellant, A043 merely summarised the results of the abrasion test and the baking test reported in example 1 of the patent as well as in examples A and B filed with its reply to the notices of opposition, and further specified the experimental conditions used in these examples. Hence, its admittance could not be contested. Moreover, having regard to the criteria to be used for assessing admittance as defined in Article 12(4) RPBA, the appellant submitted that the content of A043 was not

complex since it merely described the experimental conditions used in the examples. Additionally, it was a suitable document for addressing the issues that led to the appealed decision, since it allowed the conclusion to be reached that D41 was not suited to disproving the technical effect of the claimed subject-matter. Procedural economy was not affected either, because A043 did not give rise to any new issue.

- 3.3 The appellant conceded that an objection alleging that the patent did not describe the experimental conditions used in the reported examples had been raised by respondent-opponent 3 in its notice of opposition. However, the appellant argued that this objection had been formulated very generally in the context of inventive step and was merely one of several other objections contained in the notice of opposition. An objection of lack of inventive step should have been corroborated by experimental data. In the absence of such data, there was no need for the appellant to file A043. The appellant replied to this objection by means of arguments, which were accepted by the opposition division, which then issued a preliminary opinion in favour of inventive step. It was only when experimental data were filed with D41 that A043 became necessary, and the appellant filed the latter at the first opportunity, i.e. with the statement of grounds of appeal. It had not been possible for it to file A043 in advance of the oral proceedings before the opposition division because the information contained in A043 was not available in the period between the filing of D41 and the date of the oral proceedings. The appellant referred to decision T 291/21, in which a similar situation arose and evidence from the patentee filed with the statement of grounds of appeal was admitted.

The appellant concluded that, since A043 represented a timely response to D41, it should have been admitted.

3.4 The board decided not to admit A043 for the following reasons.

3.4.1 A043 introduces several details as regards the operating conditions, under which the abrasion test and the baking test mentioned in paragraphs [0050] and [0051] of the patent were carried out on the compositions of example 1 of the patent (table 4 in paragraph [0055]) and of examples A and B (reply to the notices of opposition, page 8). These details represent new facts relied upon in appeal proceedings for the first time. A043 thus constitutes an amendment of the appellant's appeal case within the meaning of Article 12(4) RPBA.

3.4.2 Under Article 12(4) RPBA, any amendment to a party's appeal case is subject to the party's justification for submitting the amendment in the appeal proceedings. Any amendment is admitted only at the board's discretion, exercised in view of, *inter alia*, the complexity of the amendment and the need for procedural economy. Contrary to the appellant's view, the admittance of A043 would have given rise to several complex issues to be discussed in the appeal proceedings for the first time. As submitted by the respondents, it would have had to be considered, for example, whether the mentioned details of the abrasion test and baking test were sufficient to fully describe the conditions of these tests, whether the adopted experimental conditions were suitable for use in proving the purported technical effect (improvement of the lubricating performance) and whether the difference between the experimental conditions mentioned in A043 and those used in D41 was sufficient to enable the results shown in D41 to be

disproved. Therefore, the admittance of A043 would also have been detrimental to procedural economy.

3.4.3 Moreover, under Article 12(6) RPBA, the board is not to admit, *inter alia*, facts and evidence which should have been submitted before the opposition division. As pointed out by respondent-opponent 3 and not contested by the appellant, an objection to missing experimental details as regards the conditions of the abrasion test and the baking test mentioned in the patent (paragraphs [0050] and [0051]) had been raised by respondent-opponent 3 in its notice of opposition - see page 7, lines 26 to 33. Even though the opposition division issued a preliminary opinion in favour of inventive step, the parties should be responsive to each other and not only to the EPO. Hence, the appellant should have filed A043 in response to respondent-opponent 3's objection.

3.4.4 The appellant stated that the filing of A043 represented a reaction to D41. However, even if this argument was accepted, it would not be convincing. D41 was filed on 25 April 2022, i.e. more than two months in advance of the oral proceedings before the opposition division. There is no reason apparent to the board to explain why a period of two months was not sufficient for submission of A043. In fact, as set out above, A043 does not contain new experimental data but merely specifies the experimental conditions under which the examples of the patent and the appellant's examples filed with the reply to the notice of opposition had been carried out. These experimental conditions must have been well-known to the appellant, meaning that A043 should have been filed before the opposition division, at the latest in the oral proceedings.



3.4.5 Decision T 291/21 cited by the appellant cannot support its case either. In fact, the competent board noted (see, under point 3.1 of the reasons, the paragraph referring to point 7.1 of the communication issued under Article 15(1) RPBA) that new experimental data had been filed by the patent proprietor with its reply to the grounds of appeal. These data were regarded as a reaction to new objections raised by the opponent two months prior to oral proceedings before the opposition division. The competent board considered a period of two months to be too short for the patent proprietor to prepare and file new experimental data. The data filed with the reply to the grounds of appeal were thus admitted.

The rationale used in T 291/20 is not applicable to the case at hand, where, as explained above, the objection to missing experimental details of abrasion and baking tests had been raised by respondent-opponent 3 already in its notice of opposition. Moreover, A043 did not contain new experimental data but merely specified the experimental conditions under which the examples of the patent and the appellant's examples filed with the reply to the notice of opposition had been carried out.

3.5 Based on the considerations set out above, A043 was not admitted, pursuant to Article 12(4) and (6) RPBA.

4. Document A048

4.1 A048 is an experimental report filed by the appellant by letter dated 7 September 2023, i.e. after the statement of grounds of appeal and the respondents' replies. It was filed to support the effect relied upon by the appellant for inventive step (improvement of the lubricating performance). The respondents requested that A048 not be admitted.

4.2 The appellant argued that A048 disproved the results reported in D41. A048 was filed in response to the decision of the opposition division on lack of inventive step in view of D41, which was filed only two months prior to oral proceedings. The preliminary opinion of the opposition division had been in favour of inventive step. The opposition division changed its mind only in the oral proceedings and this triggered the filing of A048 on appeal. Having regard to the criteria defined in Article 13(1) RPBA to be used by the board when deciding whether or not to admit A048, the appellant submitted that A048 had been filed early enough to be considered by all parties and the board, which could then take A048 into consideration when issuing its provisional opinion. Moreover, A048 was suitable for resolving the disputed issues since it clearly contradicted the results of D41. Its admittance would not be detrimental to procedural economy since a debate on the technical effect achieved by the claimed composition had to be conducted in any case and no new issues arose.

4.3 The board decided not to admit A048 for the following reasons.

4.3.1 Under Article 13(1) RPBA, any amendment to the appellant's case after it has filed its grounds of appeal is subject to the justification for its amendment and may be admitted only at the discretion of the board. The board exercises its discretion, *inter alia*, in view of the current state of the proceedings and the need for procedural economy.

4.3.2 As set out above, D41 had been filed before the opposition division prior to the date set according to Rule 116 EPC. Any reaction thereto, e.g. by means of experimental report A048, should have been filed with the statement of grounds of appeal at the latest. No

justification has been provided as to why this was not done. The state of the proceedings at which A043 was submitted thus spoke against admittance.

4.3.3 In A048, the appellant alleged new facts, namely that the experiments in D41 had been carried out under operating conditions that were not part of claim 1 of the main request. According to the appellant, the respondents had failed to explain why the conditions used in D41 would be in any way better than or preferable to those used in the experiments carried out by the appellant. Thus, to disprove the results shown in D41, it was sufficient to show that the same compositions gave rise to a technical effect when tested under any other reasonable conditions. This had been done in A048 using the same compositions as those used in D41, but under the conditions already employed in the examples of the patent as well as in examples A and B filed with the reply to the notices of opposition. The appellant further argued that the results shown in D41 had been obtained by applying a strong force for short periods of time. Such a strong force generated high heat, which resulted in the formation of fluorinated polymers. The surface of the test equipment was thus coated with the fluorinated polymers, which meant that the amount of wear could not be properly measured. On the contrary, in A048 the tests were conducted for long periods of time and by applying a weak force.

4.3.4 If A048 had been admitted, it would have been necessary to address all these new facts alleged by the appellant. Therefore, contrary to the appellant's view, the admittance of A048 would have raised several new, complex issues leading to a fresh case on inventive step, which would have to be considered at a later

stage of the appeal proceedings for the first time.  
This would have been detrimental to procedural economy.

4.4 Based on the considerations set out above, A048, and the submissions based on it, were not admitted into the proceedings, pursuant to Article 13(1) RPBA.

5. Document A049

5.1 A049 was filed by respondent-opponent 3 with its letter dated 19 December 2023. A049 is referred to on page 3, last two lines, of D41.

5.2 The appellant did not object to the admittance of A049, which was relied upon by both the appellant and respondent-opponent 3 during their argumentation concerning inventive step. In view of this, the board decided to admit A049 into the proceedings.

Appellant's assertion that the film formation described in document D41 is disadvantageous in refrigeration systems and formulation of the objective technical problem as the provision of a composition with improved lubricating performance without disadvantageous film formation - admittance into the proceedings - Article 13(1), (2) RPBA

6. In the oral proceedings before the board, during the discussion of inventive step, the appellant argued that the film formation reported in D41 for some of the tested refrigerant mixtures (see table 2 on page 5 of D41) was disadvantageous in refrigeration systems. Indeed, this film formation was due to a degradation of the fluorinated refrigerant with consequent formation of fluorinated polymers. Since no such film formation was reported in the patent, the objective technical problem might be formulated, *inter alia*, as the provision of a composition with improved lubricating performance without disadvantageous film formation.

- 6.1 The appellant argued that this assertion was not an amendment of its appeal case but a mere refinement of its arguments already put forward in its letter dated 7 September 2023 in the paragraph bridging pages 10 and 11. The appellant was not alleging new facts but merely proposing a different interpretation of the results reported in table 2 of D41. An appellant should be allowed to refine its arguments; otherwise, oral proceedings would serve no purpose.
- 6.2 However, the board notes that the submissions referred to by the appellant, contained in its letter dated 7 September 2023 in the paragraph bridging pages 10 and 11, were related to the content of document A048, filed with the same letter, and to the issue of whether that document could be used to disprove the results reported in D41. A048, along with all submissions based on it, hence including those in the letter dated 7 September 2023, were not admitted into the proceedings (see above). Therefore, the same considerations under Article 13(1) RPBA leading to the non-admittance of document A048 and the related submissions as contained in the appellant's letter dated 7 September 2023 spoke against the admittance of any "refinement" of these submissions.
- 6.3 Moreover, under Article 13(2) RPBA, as in force since 1 January 2024, any amendment to a party's appeal case made after notification of a communication under Article 15(1) RPBA shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.
- 6.4 Contrary to the appellant's view, with the above-mentioned assertion, the appellant did not merely refine its previous submissions but alleged new facts, namely that the formation of a film, described in D41

as being beneficial (see pages 5 to 7 of D41), was due to a degradation of the refrigerant and that this degradation was disadvantageous in refrigeration systems. The appellant's submission thus constituted an amendment of its appeal case. No exceptional circumstances existed which could have justified this amendment only in the oral proceedings before the board. In fact, as already stated above, D41 was filed before the opposition division and, therefore, any allegations concerning the results reported therein should have been submitted before the opposition division or with the statement of grounds of appeal at the latest.

- 6.5 For these reasons, the board decided not to admit the above assertion of the appellant pursuant to Article 13(1) and (2) RPBA.

Main request - claim 1 - inventive step under Article 56 EPC

7. The designations used in claim 1 of the main request (point III above) represent the following compounds:

HFO-1234yf: 2,3,3,3-tetrafluoropropene

HFO-1234ze: Z- or E-1,3,3,3-tetrafluoropropene

HFC-32: difluoromethane

HCC-40: chloromethane

HCFC-22: chlorodifluoromethane.

8. Closest prior art

- 8.1 In accordance with the appealed decision (point 4 on page 4), all parties agreed that D1 could be taken as the closest prior art for assessing inventive step.

- 8.2 Document D1 discloses (page 1, point 1; page 3, third paragraph; page 11, fourth paragraph; tables 2 and 3 on pages 41 and 46; claims 6 and 7) compositions for use

in refrigeration and air conditioning, comprising HFO-1234yf and HFC-32. HFO-1234yf corresponds to the first compound under component (1) of claim 1 (the second compound is mentioned in claim 1 as being only optional). HFC-32 corresponds to component (2) of claim 1 of the main request.

9. Distinguishing features

Although the respondents had raised a novelty objection against claim 1 of the main request, in the oral proceedings before the board, the assumption was made in the appellant's favour that the subject-matter of claim 1 of the main request differs from the compositions of D1 in that HCC-40, HCFC-22, and 3,3,3-trifluoropropyne, i.e. component (3) of claim 1 of the main request, are included in addition to HFO-1234yf and HFC-32 in an amount of 5 mass% or less, based on the total amount of components (1) to (3).

10. Objective technical problem

10.1 The appellant referred to example 1 of the patent (example 2 of the application as filed) as well as to examples A and B filed with its reply to the notices of opposition (page 8) and A048. It submitted that, on the basis of the reported results, the presence of component (3) (HCC-40, HCFC-22, and 3,3,3-trifluoropropyne) led to an improved lubricating performance. The latter was demonstrated by the lower abrasion loss measured by the abrasion test and the higher load measured by the baking test (paragraph [0047] of the application as filed) achieved by compositions falling under claim 1 of the main request in comparison with a composition not containing component (3) (see tables 4 and 5 on page 15 of the application as filed corresponding to tables 4 and 5 of

the patent, and the table on page 8 of the reply to the notices of opposition).

D41 could not be used to disprove this technical effect. In D41, the coefficient of friction (COF) and the wear scar were measured, which, however, represented different parameters as compared with abrasion loss and baking load assessed in the application as filed, examples A and B and A048. In particular, abrasion resistance was a complex function of tear strength, coefficient of friction, resilience, heat dissipation, and other properties. Thus, no comparison could be drawn between the results in D41 and the results of the appellant. Moreover, A048 demonstrated that the operating conditions chosen in D41 were not suitable for measuring abrasion. The conditions used in D41, especially the experiments being carried out at 750 N, were far too aggressive, as confirmed by A049, to which D41 referred. The appellant pointed to the abstract, the introduction and the experimental part disclosed in A049. Such conditions were not typical in the field of refrigeration and, indeed, they resulted in a disadvantageous film formation in several of the examples reported in D41 - see table 2. In this respect, the appellant noted that among the experiments reported in D41, in which no disadvantageous film formation was observed, the best results in terms of COF had been obtained with refrigerant mixture 2, i.e. a composition according to claim 1 of the main request. The appellant further submitted that, even if the results of D41 were accepted, in the presence of contradictory results the benefit of the doubt should be given to it as the patent proprietor. It referred to decision T 547/88 in this respect.



Therefore, the objective technical problem was the provision of a composition with improved lubricating performance, at least according to the baking test.

The appellant had also argued in the context of further oral submissions that, alternatively, the objective technical problem was the provision of a composition with improved lubricating performance without disadvantageous film formation. However, as set out above (see points 6. to 6.5), these further submissions and the associated formulation of the objective technical problem were not admitted into the proceedings.

- 10.2 The board does not find the appellant's arguments convincing for the following reasons.
- 10.2.1 As set out above, neither A048 nor any submission based thereon, *inter alia* the allegation that the film formation observed in some of the results reported in D41 was disadvantageous in refrigeration systems, were admitted into the proceedings. Therefore, these submissions by the appellant cannot be used to acknowledge a technical effect of the above-mentioned distinguishing features.
- 10.2.2 It is acknowledged that the results of example 1 of the patent (example 2 of the application as filed) as well as those of examples A and B filed with the appellant's reply to the notices of opposition show that compositions including all components (1) to (3) required by claim 1 of the main request have a lower abrasion loss and a higher baking load as compared with the composition of comparative example 2, which does not include component (3) (see table 4 in paragraph [0055] of the patent corresponding to table 4 in paragraph [0054] on page 15 of the application as filed, and page 8 of the appellant's reply to the

notices of opposition). However, as put forward by the respondents, experimental report D41 shows (see results in table 2 on page 5) that a different composition also including all components (1) to (3) required by claim 1 of the main request (refrigerant mixture (2) in table 1 on page 3 of D41) results in a higher COF (0.17) and higher wear scar (-0.2-0.4) compared with a composition not including component (3) (refrigerant mixture (1) in table 1 of D41), for which a COF of 0.13 and no wear scar were obtained. It is noted that refrigerant mixture (1) not including any of the compounds of component (3) of claim 1 of the main request is, according to table 2 of D41, the mixture showing the lowest COF, i.e. the best lubricating performance.

10.2.3 As regards the above-mentioned criticism expressed by the appellant against D41, the board notes that, as pointed out by the respondents, the descriptions of the abrasion test and the baking test in paragraphs [0050] and [0051] of the patent (paragraph [0047] of the application as filed) omit details which are crucial to the understanding of the conditions of these tests. The pin-on-disc abrasion test does not identify the materials of the pin or the disc, the forces applied during the test or the time for which those forces are applied. The rotational speed of the disc is not mentioned, and nor are the temperature and pressure that have been used. The same applies to the baking test, which does not specify the materials of the rod or the rotating disc, the rotational speed or torque, the load to be applied or the temperature and pressure to be used. Therefore, in D41 it was not possible to use the same experimental conditions of the abrasion and baking tests mentioned in the patent, simply because no such conditions are disclosed in the patent or in the application as filed.

10.2.4 The board concurs with the respondents in their view that, in the absence of any details in the patent, tests were chosen in D41 that are regarded as being analogous to the abrasion test and the baking test: the COF test of D41 is analogous to the baking test, and the wear scar test of D41 is analogous to the abrasion test - see the corresponding descriptions on pages 3 and 4 of D41. The test configuration used in D41 is the same as that described in A049 (see D41, last lines on page 3). Even accepting that the conditions used in D41 were "aggressive", as argued by the appellant, whatever this means, no reasons are apparent that explain why the conditions used would have had an impact on the correct assessment of a technical effect of refrigerant mixtures according to claim 1 of the main request. In fact, the same conditions were used for compositions according to claim 1 of the main request and comparative compositions.

10.2.5 The appellant stated that in the presence of contradictory results the benefit of the doubt should be given to it as the patent proprietor. However, no contradictory results are present in the case at hand since the composition according to claim 1 of the main request tested in D41 (refrigerant mixture (2)) does not correspond to any of the compositions of the appellant's examples. All that the tests show is that one of the claimed compositions does not lead to the effect relied upon by the appellant (D41) while other compositions result in that effect (compositions of the appellant's examples). There is thus no contradiction in the sense that one and the same composition according to the appellant results in the desired effect while it does not according to the respondents.

10.3 For these reasons, the board is convinced that in view of the results of D41, no technical effect of the

above-mentioned distinguishing features (presence of component (3)) is achieved across the whole scope of claim 1 of the main request.

In the absence of any technical effect, the objective technical problem, starting from D1, can only be seen as the provision of an alternative composition having good lubricating performance.

11. Obviousness of the claimed solution

11.1 The appellant submitted that the respondents' argument that component (3), i.e. HCC-40, HCFC-22 and 3,3,3-trifluoropropyne, would have been present as impurities in the compositions of D1 amounted to mere speculation. Moreover, the subject-matter of claim 1 of the main request meant that component (3) was not intended to be, or to include, the natural impurity level of components (1) and (2), but was, instead, confined to deliberately added amounts that could be clearly distinguished from an impurity level. The addition of component (3) as defined in claim 1 of the main request was not suggested in the prior art. On the contrary, the skilled person would have considered the presence of these compounds in a refrigerant composition, particularly HCFC-22, to be detrimental to the environment in view of the Montreal Protocol (A044 and A045), which banned the inclusion of chloro-fluoro compounds. A046 and A047 further explained that HCC-40 had a negative environmental impact and was no longer used as a refrigerant. Thus, the skilled person would not have had any motivation to add component (3) of claim 1 of the main request to the compositions of D1.

11.2 The board disagrees for the following reasons.

11.2.1 Claim 1 of the main request (point III above) requires component (3) to be present in an amount of 5 mass% or less based on the total amount of components (1) to

(3). No lower limit is mentioned and, therefore, impurity levels of each of the compounds mentioned under component (3) are encompassed by the subject-matter of claim 1 of the main request.

11.2.2 As pointed out by the respondents, it was known in the prior art, e.g. from documents D18 to D20, D26 and D27, that the compounds of component (3) of claim 1 of the main request are impurities commonly present in compositions containing HFO-1234yf and HFC-32 (components (1) and (2) required by claim 1 of the main request) since they are formed during the production of these two compounds. In particular:

- D18 discloses (paragraphs [0005] and [0006], claims 1 and 3) that, in preparing HFO-1234yf, certain additional compounds may be present in small amounts. D18 further states that, accordingly, a composition comprising HFO-1234yf and less than 1 weight% 3,3,3-trifluoropropyne is provided.
- D19 discloses (paragraphs [0003] and [0005]) a method for preparing HFO-1234yf by dehydrochlorination of 2-chloro-1,1,1,2-tetrafluoropropane (HCFC-244bb). According to D19 (paragraph [0008]), even small amounts of certain impurities present in the HCFC-244bb feedstock may have a negative impact on the final purity of HFO-1234yf. According to paragraph [0011] of D19, the impurities may also include 3,3,3-trifluoropropyne. Example 9 of D19 discloses a final composition containing HFO-1234yf at 99.9671% and less than 1 ppm 3,3,3-trifluoropropyne.
- D26 discloses (paragraph [0008]) a method for preparing HFO-1234yf by dehydrochlorination of 2-chloro-1,1,1,2-tetrafluoropropane (HCFC-244bb)

containing low concentrations of 2-chloro-3,3,3-trifluoropropene (HCFO-1233xf) in the presence of a metal alloy. According to D26 (paragraph [0008]), the presence of 2-chloro-3,3,3-trifluoropropene can lead to the formation of 3,3,3-trifluoropropyne as an undesired by-product.

- D27 discloses (paragraph [0003]) a process for reducing the concentration of impurities in fluoroolefins. According to paragraphs [0010] and [0011] of D27, 3,3,3-trifluoropropyne is often present in fluoroolefin products such as HFO-1234yf.
- D20 discloses (column 1, lines 4 to 31) a process for the removal of chlorine-containing impurities from difluoromethane (HFC-32) produced from chlorine-containing starting materials, for example chloro-difluoromethane and dichloro-difluoromethane. Among the impurities, HCFC-22 and HCC-40 are mentioned (table 1 in column 3).

11.2.3 Therefore, the skilled person, starting from the compositions of D1 containing HFO-1234yf and HFC-32, would have regarded a composition further containing, as impurities, the compounds of component (3) of claim 1 of the main request as an alternative obviously arising when HFO-1234yf and HFC-32 are not fully purified. As they are present at impurity levels, the skilled person would not have expected any impact of the compounds of component (3) on the lubricating performance. Furthermore, the skilled person would not have excluded this alternative in view of documents A044 to A047. In fact, according to A044 (Annex C) and A045 (pages 245 and 246), the concentration of chloro-fluoro compounds, *inter alia* HCFC-22, should be limited to 0.1% at the most. According to A046 (point 15 on page 4), the content of HCC-40 in refrigerant mixtures

should be at most 0.5%. Therefore, the skilled person would have regarded impurity levels of HCFC-22 and HCC-40 in compositions comprising components (1) and (2) of claim 1 of the main request as meeting these requirements.

11.2.4 This conclusion would not change even if one were to follow the appellant's view that component (3), present at whatever amount, has a negative environmental impact. In this case, this negative environmental impact would also be present for the claimed composition, which contains this environmentally hazardous component (3). This aspect would thus become part of the objective technical problem and the skilled person would not have been deterred from using component (3) by the fact that this component was known to have a negative environmental impact.

11.3 For these reasons, the board concludes that the subject-matter of claim 1 of the main request does not involve an inventive step in view of D1 taken as the closest prior art. The main request is thus not allowable (Article 56 EPC).

Auxiliary request 1 - claim 1- inventive step under Article 56 EPC

12. Claim 1 of auxiliary request 1 differs from claim 1 of the main request (point III above) only in that the feature "*and optionally HFO-1234ze*" has been deleted from component (1).

12.1 The appellant argued that the subject-matter of claim 1 of auxiliary request 1 had been restricted as compared with claim 1 of the main request. The amendment addressed the alleged deficiency under Article 56 EPC that a technical effect was not achieved across the whole claimed scope. In particular, D41 was no longer relevant since the compositions tested in D41 always

included also HFO-1234ze as component (1). On the contrary, HFO-1234ze was included neither in example 1 of the patent (example 2 of the application as filed) nor in examples A and B filed with the reply to the notices of opposition.

12.2 These arguments are not convincing. The board concurs with the respondents' view that the claimed scope has not been changed by the amendment made in auxiliary request 1. In fact, in view of the term "*comprising*" in claim 1 of auxiliary request 1, the optional presence of HFO-1234ze is not excluded from the claimed composition.

12.3 Therefore, the same reasoning of lack of inventive step indicated above as regards the subject-matter of claim 1 of the main request applies *mutatis mutandis* to claim 1 of auxiliary request 1.

12.4 Therefore, the subject-matter of claim 1 of auxiliary request 1 does not involve an inventive step and auxiliary request 1 is not allowable (Article 56 EPC).

#### Conclusion

13. None of the appellant's requests is allowable under Article 56 EPC.



**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



U. Bultmann

M. O. Müller

Decision electronically authenticated