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Datasheet for the decision of 22 May 2025

Case Number: T 0955/23 - 3.3.02

Application Number: 16204715.3

Publication Number: 3170880

IPC: C09K5/04, F25B1/00

Language of the proceedings: EN

Title of invention:
USE OF COMPOSITIONS COMPRISING HFO-1234ZE OR HFO-1234YF AS REFRIGERANT COMPOSITION

Patent Proprietor:
Honeywell International Inc.

Former Opponent:
ARKEMA FRANCE
Mexichem Fluor S.A. de C.V.

Relevant legal provisions:
EPC Art. 56, 76(1), 123(2)

Keyword:
Amendments
Inventive step

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Case Number: T 0955/23 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 22 May 2025

Appellant: (Patent Proprietor)	Honeywell International Inc. 115 Tabor Road Morris Plains, NJ 07950 (US)
Representative:	Crooks, Elizabeth Caroline Kilburn & Strode LLP Lacon London 84 Theobalds Road London WC1X 8NL (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 12 December 2022 revoking European patent No. 3170880 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	M. O. Müller
Members:	A. Lenzen
	R. Romandini

Summary of Facts and Submissions

I. This decision concerns the appeal filed by the patent proprietor (appellant) against the opposition division's decision (decision under appeal) to revoke European patent No. 3 170 880 (patent).

The patent was granted on European patent application No. 16204715.3 (application), which is a divisional application of European patent application No. 09177661.7 (parent application). The parent application itself is a divisional application of European patent application No. 03777896.6 (grandparent application).

II. By letters dated 28 May 2021 and 19 January 2023, the opponents withdrew their oppositions. This made the appellant the sole party to the appeal proceedings.

III. Reference is made in the present decision to the following documents filed with the opposition division:

D1a JP H4-110388 (English translation)
D4 L. R. Rudnick & R. L. Shubkin, "Synthetic Lubricants and High-Performance Functional Fluids", 1999, pages 563 to 594
D12a Latest New Refrigerant and Insulation System Technology, CF Planning Co. Ltd. (1996), Chapter 7 (English translation)
D15 HVAC Systems and Components Handbook, 2nd edn. (1997), McGraw Hill, pages 6.1.3 to 6.1.15
D17 WO 2010/075046 A2
D28 PAG Lubricant Miscibility
D36 US 5,053,155

D53 HFO-1234ze Miscibility with Lubricants
D54 HFO-1234yf Miscibility with Lubricants

IV. With the statement of grounds of appeal, the appellant filed the sets of claims of a main request and of auxiliary requests 1 to 31.

V. In preparation for the oral proceedings, which had been arranged at the appellant's request, the board issued a communication under Article 15(1) RPBA.

VI. Oral proceedings before the board were held by videoconference on 22 May 2025 in the presence of the appellant. The appellant made auxiliary request 8 its main request. At the end of the oral proceedings, the chair announced the order of the present decision.

VII. The appellant requested that the decision under appeal be set aside and that the patent be maintained based on the set of claims of the main request, filed as auxiliary request 8 with the statement of grounds of appeal.

VIII. Summaries of the appellant's submissions relevant to the present decision and key aspects of the decision under appeal are set out in the reasons for the decision below.

Reasons for the Decision

Main request (filed as auxiliary request 8 with the statement of grounds of appeal)

1. Claim 1 reads as follows:

"*Use as a refrigerant composition,*

of a composition comprising 1,3,3,3-tetrafluoropropene (HFO-1234ze) or 2,3,3,3-tetrafluoropropene (HFO-1234yf), and a lubricant selected from polyol esters."

2. Amendments (Articles 76(1) and 123(2) EPC)

2.1 The references below to the application, the parent application and the grandparent application as filed refer to the respective applications as published (application: EP 3 170 880 A1; parent application: EP 2 163 591 A2; grandparent application: WO 2004/037913 A2).

2.2 Claim 1 of the main request - grandparent application as filed (Article 76(1) EPC)

2.2.1 The grandparent application as filed has a clear structure. As far as the actual invention is concerned, it begins with a description of its compositions (page 5, line 15 to page 8, line 15), followed by their various applications (page 8, line 17 to page 17, line 11) and an example section (page 17, line 13 to page 20, line 20). In so far as the grandparent application as filed relates to the application of the compositions to heat transfer, it states the following (page 8, line 18 to page 9, line 7):

"*Although it is contemplated that the compositions of the present invention may include the compounds of the present invention in widely ranging amounts, it is generally preferred that refrigerant compositions of the present invention comprise compound(s) in accordance with Formula I, and even more preferably Formula II, in an amount that is at*

least about 50% by weight, and even more preferably at least about 70 % by weight, of the composition.

The compositions of the present invention may include other components for the purpose of enhancing or providing certain functionality to the composition, or in some cases to reduce the cost of the composition. For example, refrigerant compositions according to the present invention, especially those used in vapor compression systems, include a lubricant, generally in amounts of from about 30 to about 50 percent by weight of the composition. ... Commonly used refrigeration lubricants such as Polyol Esters (POEs) and Poly Alkylene Glycols (PAGs) that are used in refrigeration machinery with hydrofluorocarbon (HFC) refrigerants may be used with the refrigerant compositions of the present invention."

2.2.2 Thus this passage discloses the use as a refrigerant composition of a composition comprising compounds in accordance with formula I and a lubricant selected from polyol esters (POEs) and polyalkylene glycols (PAGs).

Furthermore, in the grandparent application as filed (page 6, lines 25 to 30), three specific compounds are mentioned as particularly preferred among the compounds according to formula I, two of which are recited in claim 1 of the main request (HFO-1234ze and HFO-1234yf). In example 2, various lubricants are tested for their miscibility with, *inter alia*, HFO-1234ze. The POE and PAG lubricants tested are highlighted and POE lubricants show even better miscibility than PAG lubricants. Thus, while the further limitations in claim 1 relating to specific compounds according to formula I (HFO-1234ze,

HFO-1234yf) and lubricants (POEs) are selections from the more general teaching of the passage quoted above, the grandparent application as filed still discloses corresponding pointers to these selections. The subject-matter of claim 1 is thus directly and unambiguously disclosed in the grandparent application as filed.

2.2.3 The opposition division held that the last sentence of the passage quoted above, i.e.

> "*Commonly used refrigeration lubricants such as Polyol Esters (POEs) and Poly Alkylene Glycols (PAGs) that are used in refrigeration machinery with hydrofluorocarbon (HFC) refrigerants may be used with the refrigerant compositions of the present invention.*"

defined a subset of POE and PAG lubricants, namely those that were used in refrigeration with only the hydrofluorocarbon refrigerants (HFCs), but excluded POE and PAG lubricants which were used with any other type of refrigerant. Claim 1 of the main request did not limit the POE and PAG lubricants accordingly, and hence, according to the opposition division, its subject-matter extended beyond the content of the grandparent application as filed.

However, the board agrees with the appellant that the skilled person would understand the above sentence differently in the light of their common general knowledge (see: D4, page 566 under "The Need for Synthetics"; D12a, page 5, second paragraph; D15, chapter 6.1.5.1, first and second paragraphs). Up to the filing date of the patent, the development of refrigerants was roughly as follows. Originally,

chlorofluorocarbons (CFCs) were used as refrigerants. Due to their adverse effects on the ozone layer, CFCs were first replaced by hydrochlorofluorocarbons (HCFCs) and finally by hydrofluorocarbons (HFCs). The HFCs were the refrigerants used as of the filing date of the patent. The different types of refrigerants (CFCs, HCFCs, HFCs) required different lubricants. While mineral oil in particular was used as a lubricant for CFCs and HCFCs, the HFCs proved to be immiscible with it. Therefore new lubricants had to be developed for the HFCs during the transition from CFCs and HCFCs to HFCs. These new lubricants were POEs and PAGs. In the light of this common general knowledge, the skilled person would understand the sentence quoted above to refer to POEs and PAGs as lubricants that were used with HFCs to distinguish them from the lubricants that were used with CFCs and HCFCs, such as mineral oil in particular. The above sentence does not define a subset of lubricants. Rather, it is merely a statement of fact, namely that POEs and PAGs were used with HFCs.

2.3 Claims 2 to 6 of the main request - grandparent application as filed (Article 76(1) EPC)

The passage of the grandparent application as filed quoted above also provides a basis for the subject-matter of dependent claims 2 to 4 of the main request, which specify the amounts of the compounds according to formula I and the lubricant in the refrigerant composition. The subject-matter of dependent claim 5, which defines the global warming potential of the refrigerant composition, and that of claim 6, further defining the field of application, is based on page 8, lines 3 to 5 and page 10, lines 25 to 28 of the grandparent application as filed, respectively.

2.4 Claims 1 to 6 of the main request - parent application as filed (Article 76(1) EPC) and application as filed (Article 123(2) EPC)

The above considerations apply *mutatis mutandis* to the parent application and the application as filed, as both contain the same passages mentioned above in relation to the grandparent application.

2.5 It follows that the claimed subject-matter of the main request does not extend beyond the content of the grandparent application as filed (Article 76(1) EPC), the parent application as filed (Article 76(1) EPC) and the application as filed (Article 123(2) EPC).

3. Amendments (Article 123(3) EPC) and clarity (Article 84 EPC)

The set of claims of the main request differs from the granted claims only in that claim 7 as granted, and the alternative of claim 1 as granted according to which the lubricant can be selected from PAGs, have been deleted. These amendments neither extend the scope of protection nor introduce non-compliance with Article 84 EPC.

4. Inventive step (Article 56 EPC)

4.1 Closest prior art

In the decision under appeal, the opposition division considered D1a to be the closest prior art. Unlike the board, the appellant did not share this view. However, it is not necessary to justify why D1a is still regarded as the closest prior art, as the appellant is not adversely affected by the final decision.

4.2 Distinguishing feature

As already set out by the board in its communication under Article 15(1) RPBA and recognised by the appellant at the oral proceedings,

- D1a (examples 2 and 5; page 6, lines 1 to 20) discloses compositions comprising HFO-1234ze or HFO-1234yf and an undefined lubricant as well as the use of these compositions as a refrigerant composition
- the subject-matter of claim 1 of the main request differs from D1a only in that the lubricant is selected from POEs.

The opposition division essentially drew the same conclusions (decision under appeal, page 20, point 3.6.2).

4.3 Technical effects and objective technical problem

4.3.1 With regard to technical effects, the appellant referred to, *inter alia*, the experimental data in example 2 of the patent, D17 (table 1, sample 2), D28 (figure), D53 (table) and D54 (table).

4.3.2 Example 2 of the patent (HFO-1234ze), D53 (HFO-1234ze) and D54 (HFO-1234yf) show that the refrigerants of claim 1 have excellent miscibility with the POEs tested over the temperature range of -10 to 20 °C, i.e. a temperature range which may be considered crucial for the applications in question (see D36, column 2, lines 13 to 20). None of the experimental data shows that one of the refrigerants of claim 1 is not miscible with a POE in this temperature range. In contrast, at

least some PAGs are immiscible with the refrigerants of claim 1 under these conditions (D17, D28).

The selection of the class of POEs over, for example, the PAGs shown in D17 and D28, whereby both POEs and these PAGs fall under the general reference in D1a to an undefined lubricant, thus entails higher miscibility over the temperature range of -10 to 20 °C.

4.3.3 The objective technical problem, therefore, is to provide a refrigerant composition with improved miscibility over the temperature range of -10 to 20 °C.

4.3.4 The opposition division's reasoning for not acknowledging a technical effect was as follows (decision under appeal, page 24, point 5.2.2):

> "*Considering that there are many more POE available as refrigerant among those used in refrigeration machinery with hydro fluorocarbon (HFC) refrigerants, and the fact that no data is presented for negative temperatures for instance,* ***OD*** *concluded that the improved miscibility has not been demonstrated over the whole claimed range.*"

The board notes, however, that data are available for POEs that demonstrate excellent miscibility in the temperature range from 0 to 20 °C (D53, D54). There is no apparent reason (at least none was provided by the opposition division) not to assume the same for lower temperatures down to -10 °C. Similarly, the opposition division's mere statement that the improved miscibility cannot be achieved with other POEs is a mere allegation without any further substantiation and is therefore not convincing.

4.4 Obviousness

As is evident from the above, in the present case the objective technical problem must be formulated more ambitiously than the opposition division did. The decision under appeal does not contain any reasoning on obviousness based on this more ambitious objective technical problem. In particular, there is no reasoning as to why it should be obvious that POEs perform better than some PAGs. Furthermore, apart from the appellant's submissions, no further submissions from e.g. the former opponents were received on appeal. The board, in turn, fails to see any reason to consider the solution to the more ambitious problem obvious.

It follows that the subject-matter of claim 1 of the main request and its dependent claims 2 to 6 involves an inventive step. The main request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent with claims 1 to 6 of the main request, filed as auxiliary request 8 with the statement of grounds of appeal, and a description possibly to be adapted thereto.

The Registrar: The Chairman:

U. Bultmann M. O. Müller

Decision electronically authenticated