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**Datasheet for the decision  
of 29 May 2018**

**Case Number:** T 1924/16 - 3.3.10

**Application Number:** 09172381.7

**Publication Number:** 2308941

**IPC:** C09K5/04

**Language of the proceedings:** EN

**Title of invention:**

Refrigerant compositions and use thereof in low-temperature refrigeration systems

**Patent Proprietor:**

Honeywell International Inc.

**Opponents:**

ARKEMA FRANCE  
Mexichem Amanco Holding S.A. de C.V.

**Headword:**

**Relevant legal provisions:**

EPC Art. 56  
RPBA Art. 13(1)

**Keyword:**

Inventive step - (no) - main request and first to sixth  
auxiliary requests  
Late-filed seventh auxiliary request - admitted (no)

**Decisions cited:**

T 0020/81, T 0230/07, T 1130/09

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 1924/16 - 3.3.10

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.10**  
**of 29 May 2018**

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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
29 July 2016 concerning maintenance of the  
European Patent No. 2308941 in amended form.**

**Composition of the Board:**

**Chairman** P. Gryczka  
**Members:** R. Pérez Carlón  
T. Bokor

## Summary of Facts and Submissions

- I. The appellant (opponent 1) filed notice of appeal against the decision of the opposition division which resulted in European patent No. 2 308 941 being maintained in the form of the first auxiliary request then pending.
- II. Two notices of opposition had been filed on the grounds of added subject-matter (Article 100(c) EPC), insufficiency of disclosure (Article 100(b) EPC), and lack of novelty and inventive step (Article 100(a) EPC). Both opponents appealed.
- III. Opponent 2 withdrew its appeal and became thus party as of right in these proceedings.
- IV. The documents filed during the opposition proceedings include the following:

D1 EP 0 509 673 A1  
D8 EP 0 451 692 A2

The experimental evidence filed during the opposition proceedings includes the following:

D14 Low Temp Tests - 2013  
D15 Medium Temp Tests - 2013

- V. With its response to the grounds of appeal, the respondent (patent proprietor) filed a main request and first to sixth auxiliary requests.

Claim 1 of the main request and of the first and second auxiliary requests corresponds to claim 1 of the first auxiliary request before the opposition division and

reads as follows:

*"A process for producing low-temperature refrigeration in a refrigeration system, said process comprising the steps of:*

*i) condensing a refrigerant composition comprising (a) 28-38 wt% difluoromethane (HFC-32), (b) 28-38 wt% pentafluoroethane (HFC-125), and (c) 38-48 wt% tetrafluoroethane (HCF-134a); and*

*ii) evaporating the composition in the vicinity of a body to be cooled,*

*wherein the evaporator temperature of the refrigeration system is below 0°C (32°F)."*

Claim 1 of the third and fifth auxiliary requests differs from claim 1 of the main request in that feature i) further contains the following:

*"wherein the components a), b) and c) comprise substantially the entire refrigerant composition".*

Claim 1 of the fourth and sixth auxiliary requests differs from claim 1 of the main request in that feature i) is worded as follows:

*"i) condensing a refrigerant composition comprising (a) about 30 wt% difluoromethane (HFC-32), (b) about 30 wt% pentafluoroethane (HFC-125), and (c) about 40 wt% tetrafluoroethane (HFC-134a);"*

During the oral proceedings before the board of appeal, which took place on 29 May 2018, the respondent filed a seventh auxiliary request, claim 1 of which reads as

follows:

"A process for producing low-temperature refrigeration in a refrigeration system, said process comprising the steps of:

i) condensing a refrigerant composition comprising (a) about 30 wt% difluoromethane (HFC-32), (b) about 30 wt% pentafluoroethane (HFC-125), and (c) about 40 wt% tetrafluoroethane (HFC-134a), wherein the components a), b) and c) comprise substantially the entire refrigerant composition; and

ii) evaporating the composition in the vicinity of a body to be cooled,

wherein the evaporator temperature of the refrigeration system is below 0°C (32°F) and

wherein the refrigeration system is suitable for use with chlorodifluoromethane (HFC-22) and the refrigerant composition is substituted for HFC-22 in the system."

VI. The opposition division concluded *inter alia* that document D1, which was the closest prior art, disclosed a process for producing low-temperature refrigeration which differed from that of claim 1 by virtue of the relative amounts of the three components of the refrigerant composition required by step i). Having regard to D1, the problem underlying the claimed invention was how to provide an improved low-temperature refrigeration system using R22 replacement refrigerants, and an improved process using said R22 replacement refrigerants (page 20, lines 3-6 of the contested decision). The solution, which was characterised by the composition of the cooling

mixture, was inventive having regard to the prior art.

VII. The arguments of the appellant where relevant for the present decision were as follows:

If claim 1 were to be considered novel, document D1 was the closest prior art. The process of claim 1 of the main request would differ from the process of D1 by virtue of the relative amounts of the components of the refrigerant composition required by step i) of claim 1. If the experimental evidence filed by the respondent showed that it was not necessary to change the expansion valve of the refrigerant system if R22 was replaced by the composition of the invention, this was nevertheless not a feature of claim 1. For that reason, the sole problem which could be considered solved by the feature of claim 1 was how to provide an alternative process for producing low-temperature refrigeration. The claimed solution, which was characterised by the relative amounts of the components of the refrigerant composition required by step i) of claim 1, was obvious having regard to either of document D1 or D8. For those reasons, the process of claim 1 of the main request was not inventive.

This argument applied in the same manner to claim 1 of the first to sixth auxiliary requests.

The seventh auxiliary request was filed late and did not *prima facie* solve the issue of inventive step. It should thus not be admitted into the proceedings.

VIII. The arguments of the respondent where relevant for the present decision were as follows:

Document D1 was the closest prior art, and disclosed a



process which differed from that of claim 1 by virtue of the relative amounts of the components of the refrigerant composition required by step i) of claim 1. Experimental evidence D14 and D15 showed that the claimed process allowed R22 to be replaced without changing the expansion valve, and the prior art opposed to the claimed invention did not relate to that effect. For that reason, the method of claim 1 of the main request and of the first to sixth auxiliary requests was inventive.

Claim 1 of the seventh auxiliary request was merely a combination of granted claims and could thus not take the appellant unawares. As the seventh auxiliary request addressed all the issues raised by the appellant, it should be admitted into the proceedings.

- IX. The party as of right did not make any submission during these appeal proceedings, and did not attend the oral proceedings before the board.
- X. The final requests of the parties were the following:
- The appellant requested that the decision under appeal be set aside and the patent revoked.
  - The respondent requested that the patent be maintained in the form of the main request, filed with its response to the grounds of appeal dated 11 April 2017, or subsidiarily, in the form of one of the first to sixth auxiliary requests, filed on the same date, or of the seventh auxiliary request, filed at the oral proceedings before the board.

- The party as of right did not submit any formal requests.

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

### **Reasons for the Decision**

1. The appeal is admissible.
2. The parties had different views on the issue of novelty, *inter alia* over document D1.

As the board holds that the claimed subject-matter is not inventive even if it were considered novel, as explained below, it is not necessary to decide on this point.

Inventive step, main request

3. Claim 1 relates to a process for producing low-temperature refrigeration comprising the steps of condensing a refrigerant having the following composition:

28 to 32 wt% HFC-32  
28 to 32 wt% HFC-125, and  
38 to 42 wt% HFC-134a,

and evaporating said composition in the vicinity of a body to be cooled, wherein the evaporation temperature of the refrigeration system is below 0°C.

4. Closest prior art

The appellant argued that, if the process of claim 1 were to be considered novel, document D1 was the closest prior art, in agreement with the opposition division and the respondent. The board sees no reason to differ.

It was not disputed that document D1 taught a process for refrigeration (page 1, lines 3-4) by evaporating a liquid refrigerant at low pressure, taking heat from the surrounding zone (page 1, lines 7-8), wherein said refrigerant was a ternary mixture consisting essentially of (page 4, lines 35 to 39)

25 to 55 wt% HFC-32  
5 to 45 wt% HFC-125, and  
25 to 55 wt% HFC-134a.

It was also not disputed that the relative amounts of these components in the refrigerant composition required by step i) of claim 1 represented a sub-range of those disclosed in D1.

In the following it will be considered, in favour of the respondent, that claim 1 is novel by virtue of requiring a composition whose relative amounts represent a novel sub-range within those disclosed in document D1 (T 230/07, not published in OJ EPO, Headnote, T 1130/09, not published in OJ EPO, Reasons 3.2).

5. Technical problem underlying the invention

5.1 According to the case law of the boards of appeal of the EPO, the definition of the technical problem to be solved should normally start from the technical problem actually described in the patent in suit in relation to

the closest state of the art indicated there. Only if it turns out that an incorrect state of the art has been used or that the technical problem disclosed has in fact not been solved or has for some reason not been correctly defined, is it appropriate to consider another problem which objectively existed.

5.2 The respondent formulated the technical problem underlying the claimed invention as how to provide a process for refrigeration in a refrigeration system at low and very low-temperatures, in which R22 is replaced without changing the system's expansion valve.

5.3 However, claim 1 is not restricted to processes which include replacing R22, but also relates to processes carried out in (new) systems specifically designed for the refrigerant composition required by step i), for which the issue of adjusting/replacing the expansion valve does not arise.

Therefore, the technical problem of not requiring the expansion valve to be adjusted/replaced cannot be used in the assessment of inventive step for the subject-matter claimed.

5.4 The respondent argued that following the problem-solution approach it merely needed to prove an effect over the closest prior art, and that the effect was due to the distinguishing features of the claimed invention. Experimental evidence D14 and D15 showed such an effect over the closest prior-art document D1. The technical problem could be formulated taking into account the effect achieved.

However, the board holds that in this context it needs to be examined whether the problem of adapting/

replacing the expansion valve when replacing R22 with the composition defined in the claim arises for every **process** according to claim 1. This is not considered to be the case for the reasons explained above.

- 5.5 The respondent further argued that an inventive step based on the presence of an unexpected effect would have been acknowledged if claim 1 were directed to a composition. The patent proprietor should not be in a more disadvantageous position by claiming a process involving said composition.

The board can only speculate as to why claim 1 is not directed to a composition, and can only decide on the claims before it, which are related to a process. As the process of claim 1 does not achieve the required effect, this argument of the respondent cannot succeed.

- 5.6 Lastly, the respondent argued that the EPC did not require the effect sought by the invention to be part of the claims.

The board agrees with this argument. However, the question is not whether the effect should be a feature of the claim but whether the definition of the problem based on this effect applies to the claimed process, which is not the case.

- 5.7 Reformulation of the technical problem

Accordingly, the technical problem as defined by the respondent needs to be reformulated as how to provide an alternative process for producing low-temperature refrigeration.

6. Solution

The solution to this technical problem is the claimed process requiring condensing and evaporating a refrigerant composition in the vicinity of a body to be cooled, characterised in that it requires the refrigerant composition to comprise

28 to 32 wt% HFC-32  
28 to 32 wt% HFC-125, and  
38 to 42 wt% HFC-134a.

7. Success

It is not disputed that this technical problem has been solved by the process which is the subject-matter of claim 1.

8. It thus remains to be decided whether or not the proposed solution to the objective problem defined above is obvious from the prior art.

8.1 The skilled person, trying to obtain a process for producing a low-temperature refrigeration as an alternative to that of D1, would consider employing refrigerant compositions encompassed by claim 1. The relative amounts of said components required by step i) of claim 1 fall within the most preferred ranges in D1 and are very close to those of its examples. For these reasons, the process of claim 1 is obvious for the skilled person and thus not inventive having regard to document D1 alone.

8.2 In addition, document D8 discloses (figure 3) ternary mixtures of the three components required in step i) of claim 1 as suitable refrigerants. Employing any of

these ternary mixtures in a refrigeration system would thus be an obvious option for the skilled person seeking an alternative. Claim 1 is thus not inventive having regard to documents D1 and D8.

For these reasons, it is concluded that the process of claim 1 is not inventive, contrary to the requirements of Article 56 EPC.

- 8.3 The respondent argued that document D8 led away from the claimed invention, as the composition required by step i) of claim 1 fell outside the non-flammable area, delimited by the discontinuous line in figure 3.

However, document D8 merely discloses that the refrigerants above the broken line are non-flammable (page 4, lines 1-2), and does not indicate whether or not the remaining ones have been tested. Further, the composition required by claim 1 lies just at the limit of the marked area. Lastly, D1 discloses the compositions of which those required by claim 1 represent a sub-range as being non-flammable (page 5, line 19). For these reasons, the respondent's arguments are not convincing.

- 8.4 Lastly, the respondent argued that there was no pointer in the prior art towards using the specific composition required by step i) of claim 1.

However, arbitrarily selecting one among various equally suitable alternatives cannot be considered to involve an inventive step.

- 8.5 The board thus concludes that the process of claim 1 of the main request is not inventive within the meaning of Article 56 EPC, with the consequence that this request

is not allowable.

Inventive step, first to sixth auxiliary requests

8.6 The respondent did not provide any arguments with respect to the processes of claim 1 of the first to sixth auxiliary requests over and above those put forward in the context of the main request.

8.7 Claim 1 of the first and second auxiliary requests corresponds to claim 1 of the main request. As the claimed process is not considered inventive, these requests are not allowable.

8.8 Claim 1 of the third and fifth auxiliary requests limits the process of the main request by requiring components (a), (b) and (c) to comprise substantially the entire refrigerant composition. This limitation does not change the arguments above with respect to inventive step for the main request. For this reason, these requests are also not allowable.

8.9 Lastly, claim 1 of the fourth and sixth auxiliary requests limits the amount of components of the composition required by claim 1 to

about 30% wt% HFC-32  
about 30% wt% HFC-125, and  
about 40 wt% HFC-134a.

The arguments with respect to inventive step for the main request above still apply in the same manner, with the consequence that these requests are not allowable either.



Admission, seventh auxiliary request

9. According to Article 12(2) RPBA, the statement of grounds of appeal and the response must contain the parties' complete cases. If, at a later stage of the proceedings, a party wants other requests to be considered, admission of these requests into the proceedings is a matter of discretion for the board of appeal (Article 13(1) RPBA).
  
10. The seventh auxiliary request was filed at an advanced stage of the oral proceedings before the board, after the discussion on the issue of inventive step considering document D1 as the closest prior art and the technical problem as formulated by the respondent. These issues had already been discussed before the opposition division. Thus, there was no unexpected situation which could justify the filing of this request at such a late stage. For this reason alone, the board saw no reason exercise its discretion and admit said request into these proceedings.
  
- 10.1 Moreover, claim 1 of the seventh auxiliary request, which combines the features of claims 1 to 3 and 10 as granted, merely requires the system to "be suitable" for use with R22, and to contain the mixture required by step i) of claim 1 instead of R22. It does not necessarily require a step of replacing the latter with the former.

Thus, claim 1 of the seventh auxiliary request *prima facie* does not solve the objections raised against claim 1 of the remaining requests. For this reason too the board decided not to exercise its discretion under Article 13(1) RPBA and allow the seventh auxiliary request into the proceedings.

**Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



B. Atienza Vivancos

P. Gryczka

Decision electronically authenticated