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**Datasheet for the decision
of 24 April 2019**

Case Number: T 1515/15 - 3.3.02
Application Number: 09711298.1
Publication Number: 2243819
IPC: C10M169/04, C09K5/04,
C10M107/34, C10M129/18,
C10N20/02, C10N20/04,
C10N30/00, C10N30/10, C10N40/30
Language of the proceedings: EN

Title of invention:
LUBRICATING OIL COMPOSITION FOR REFRIGERATING MACHINE

Applicant:
Idemitsu Kosan Co., Ltd.

Headword:

Relevant legal provisions:

RPBA Art. 13
EPC Art. 84, 56

Keyword:

Late-filed requests
Claims - clarity
Inventive step

Decisions cited:

T 0739/16, T 1784/14

Catchword:



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Case Number: T 1515/15 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 24 April 2019

Appellant: Idemitsu Kosan Co., Ltd.
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 16 February
2015 refusing European patent application No.
09711298.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman M. O. Müller
Members: S. Bertrand
P. de Heij

Summary of Facts and Submissions

- I. The appeal by the applicant (hereinafter "appellant") lies from the decision of the examining division to refuse European patent application EP 09 711 298.1 on the basis of the then pending main request and auxiliary request.

- II. The following documents are referred to in the present decision:

D2: WO 2005/103187 A1, and
D4: JP 6 240278 A & EP 0 612 835 A

- III. In its decision the examining division came inter alia to the conclusion that the invention as defined in claim 1 of both requests did not meet the requirements of Article 84 EPC and did not involve an inventive step in view of D2 as the closest prior art.

- IV. In its statement setting out the grounds of appeal, the appellant requested that the decision under appeal be set aside and that the application be granted on the basis of the main request or alternatively auxiliary requests 1 to 5, all requests filed with the grounds of appeal. Additional experiments were filed to support inventive step. The reasoning of the examining division was contested and it was submitted that the subject-matter according to all claim requests involved an inventive step starting from D2 as the closest prior art.

- V. In preparation for the oral proceedings, the board issued a communication drawing the appellant's attention to issues that might possibly be debated at the oral proceedings. In particular, it expressed the

preliminary opinion that some of the claims according to all the requests were not clear and that the subject-matter claimed in all requests did not appear to involve an inventive step.

VI. In its reply to the board's communication dated 28 March 2019, the appellant filed a new main request and seven auxiliary requests. The main request contains six claims, the sole independent claim 1 reading as follows:

"1. A composition for a refrigerator containing a lubricant composition and a refrigerant characterized in that:

*(i) the lubricant composition comprises a base oil containing a polyoxyalkylene glycol derivative as a main component in the base oil; and
1 to 20% by mass of a monoepoxy compound based on a total amount of the lubricant composition, and
(ii) the refrigerant is an unsaturated fluorinated hydrocarbon compound represented by the formula (A),*

*wherein R represents H; "p" represents 2 to 6, "r" represents an integer of 1 to 12, and "s" represents an integer of 0 to 11; and provided that one or more carbon-carbon unsaturated bonds are included in a molecule,
wherein the polyoxyalkylene glycol derivative comprises a compound represented by a general formula (I):*

wherein R^1 represents a hydrogen atom, an alkyl group having 1 to 10 carbon atoms, an acyl group having 2 to 10 carbon atoms, or an aliphatic hydrocarbon group having 2 to 6 binding sites and 1 to 10 carbon atoms; R^2 represents an alkylene group having 2 to 4 carbon atoms; R^3 represents a hydrogen atom, an alkyl group having 1 to 10 carbon atoms, or an acyl group having 2 to 10 carbon atoms; "n" represents an integer of 1 to 6; "m" represents a number with which an average value of "mxn" becomes 6 to 80; and when a plurality of OR^2 's are present, the plurality of OR^2 's may be identical to or different from each other, and when a plurality of $[(OR^2)_m - OR^3]$'s are present, the plurality of $[(OR^2)_m - OR^3]$'s may be identical to or different from each other."

Dependent claims 2 to 6 define specific embodiments of the composition of claim 1.

- VII. Oral proceedings before the board were held on 24 April 2019.
- VIII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the set of claims of the main request, or alternatively, on the basis of auxiliary requests 1 to 5 filed with the letter dated 28 March 2019 and auxiliary request 6 filed at the oral proceedings.

- IX. The appellant's arguments, where relevant to the present decision, may be summarised as follows:
- The amount of monoepoxy compound relative to the amount of lubricant composition was clear because the skilled person would understand that any additive was to be considered part of the lubricant and not the refrigerant.
 - D2 represented the closest prior art.
 - The subject-matter of claim 1 differed from the composition disclosed in D2 in the type of polyoxyalkylene glycol derivative represented by the general formula (I) and in the refrigerant represented by the general formula (A).
 - The additional experiments showed the beneficial effects of the compositions of the examples of the application in comparison to example 2 of D2 and that the type of refrigerant had an influence on the properties of the final compositions.
 - The effect shown by the additional experiments was achieved by any monoepoxy compound covered by claim 1 and considered suitable by the skilled person.
 - Documents D2 and D4 remained silent in regard to the technical effect achieved by the unsaturated refrigerant alone.

Reasons for the Decision

1. Admittance of the requests

1.1 In the present case, the main request and auxiliary requests 1 to 5 were filed with letter of 28 March 2019 and auxiliary request 6 was filed during oral proceedings. The claim requests were thus filed after filing the statement setting out the grounds of appeal and after oral proceedings had been arranged. A request filed at such a late stage of the proceedings may only be admitted at the discretion of the board, pursuant to Article 13 RPBA.

1.2 Main request and auxiliary requests 1 to 4 - Admittance

The main request and auxiliary requests 1 to 4 correspond essentially to the main request and auxiliary requests 1, 3-5 filed with the grounds of appeal, wherein claims 5-10 were deleted and claim 1 was rephrased. Thus, the requests did not raise any new issues the board was not in a position to deal with.

Therefore, the main request and auxiliary requests 1 to 4 were admitted into the proceedings according to Article 13 (1) and (3) RPBA.

1.3 Auxiliary request 5 - Admittance

The claims according to auxiliary request 5 were recast as use claims in contrast to the claims according to the main request and auxiliary requests 1 to 4. No explanation for justifying the change of category was provided by the appellant in the letter accompanying the requests.

During the oral proceedings, the appellant submitted that the change of category overcame the objection of lack of clarity regarding the amount of the monoepoxy compound raised by the board in its communication issued in preparation for the oral proceedings. The amendment of the case was self-explanatory.

The board agrees with the appellant. A substantiation as to why amendments are filed may exceptionally not be needed if they are self-explanatory in the sense that they are such as to put the board in a position to understand - without any further explanation - why they overcome any outstanding objections (T 1784/14, reasons 3.4). In its communication, the board had observed that the amount of monoepoxy compound based on the total amount of lubricant composition in product claim 1 of the main request lacked clarity since it was not clear which part of the overall composition belonged to the lubricant composition and which to the refrigerant. Unlike product claim 1, claim 1 according to auxiliary request 5 is a use claim implying the use of a lubricant composition in a refrigerator. It is clear from the wording of this claim that the amount of the monoepoxy compound is based on the whole lubricant composition and is independent from the refrigerant.

The amendment is thus self-explanatory and is made in response to the board's objection of lack of clarity raised for the first time in its communication issued in preparation for the oral proceedings.

For these reasons, auxiliary request 5 was admitted into the proceedings pursuant to Article 13(1) and (3) RPBA.

1.4 Auxiliary request 6 - Admittance

Auxiliary request 6 was filed during oral proceedings in response to the objection of added matter raised during oral proceedings by the board regarding the claims according to (previous) auxiliary requests 6 and 7 (see the minutes).

The claims clearly overcome the objection of added subject-matter and represent a response to the board's objection. As the claims are also otherwise prima facie allowable, auxiliary request 6 was admitted into the proceedings pursuant to Article 13(1) and (3) RPBA.

2. Main request

2.1 Article 84 EPC

Claim 1 refers to a composition (hereinafter "overall composition") containing inter alia a lubricant composition comprising a base oil containing a polyoxyalkylene glycol derivative as a main component and certain amounts of a monoepoxy compound based on the total amount of the lubricant composition ("1 to 20% by mass of a monoepoxy compound based on a total amount of the lubricant composition").

Claim 1 uses the open language ("*containing*") and does not exclude the presence of further ingredients in the overall composition.

In order to be able to tell, whether in a given composition the amount of monoepoxy compound is as required by claim 1, it would be necessary to know whether any other component contained in the overall

composition belongs to the lubricant composition or not.

2.1.1 The appellant argued that the skilled person would not interpret claim 1 as set out above, the preparation of the composition in the description making it clear that the refrigerant did not contain any further additive or ingredient. More specifically, the description referred in a first part to the ingredients used for the refrigerant (paragraphs [0011] to [0019]) and in a second part to the ingredients used for the lubricating oil composition (paragraphs [0020] [0036]). The part referring to the refrigerant did not disclose any further ingredient other than a refrigerant. Also, the wording of claim 1 excluded that the refrigerant comprised further ingredient other than the unsaturated fluorinated hydrocarbon compound represented by formula (A). The appellant referred to T 739/16, reasons 2.3 in that context.

2.1.2 The board cannot accept the appellant's arguments. Claim 1 uses an open language and, for this reason, does not exclude the presence of further ingredients in the overall composition claimed. For instance, the claim does not exclude the presence of an antioxidant or a diluent in that composition.

Consequently, the overall composition may encompass additional optional ingredients.

The fact that the description does not teach to add any further ingredient to the refrigerant is not relevant in determining whether a further ingredient is present in the overall composition. For instance, an antioxidant such as a phenol derivative may be present in the overall composition and this component is

suitable for both a lubricant composition and a refrigerant composition. Also diluents may be present in the overall composition and it is also known in the art that diluents may be used for preparing refrigerant compositions or for preparing lubricating oil compositions.

Claim 1 does not clarify to which entity any further optional ingredient, which is suitable for both a lubricant composition and a refrigerant, belongs. Depending on whether any such further ingredient belongs to the lubricant composition or not, the amount of the monoepoxy compound based on the lubricant composition will be lower or higher. For this reason, the amount of the monoepoxy compound, based on the unclearly defined amount of the lubricant composition, is ambiguous.

2.1.3 The reference to T 739/16 is not relevant for the present case.

In said decision (see reasons, 2.3), the question was whether the skilled person had been able to identify and quantify a modified zeolite present in a final catalyst having a specific structure due to the particular method of preparation illustrated in the description of the application. The board in that case decided that analytical methods were available to the skilled person to quantify the amount of modified zeolite beta. In the present case however, the amount of the monoepoxy compound cannot be clearly established.

2.1.4 Therefore the content of the monoepoxy compound in claim 1 according to the main request is not clear and

claim 1 does not fulfill the requirements of Article 84 EPC.

3. Auxiliary requests 1 to 4

3.1 The board notes that claim 1 of each of auxiliary requests 1 to 4 differs from claim 1 of the main request in the definition of the refrigerant (ii) and that claim 1 of each of auxiliary requests 2 to 4 further differs from that claim in the definition of the monoepoxy compound.

The amendments made in claim 1 of each of auxiliary requests 1 to 4 do not clarify the entity (lubricant composition or overall composition) to which any optional ingredient of claim 1 belongs (2.1.2, *supra*).

3.2 The board therefore concludes that the reasoning for lack of clarity of claim 1 according to the main request applies *mutatis mutandis* to claim 1 of each of auxiliary requests 1 to 4.

4. Auxiliary request 5 - Inventive step

4.1 Claim 1 according to auxiliary request 5 is recast as a use claim, compared to claim 1 of the main request.

4.2 The invention

The invention as defined in claim 1 concerns the use of a lubricant composition containing a polyoxyalkylene glycol (PAG) derivative comprising a compound represented by the general formula (I) and 1 to 20 % by mass of a monoepoxy compound for a refrigerator, the refrigerant of which being an unsaturated fluorinated hydrocarbon of formula (A) alone.

The aim of the invention lies in lubricant compositions for refrigerators having a low global warming potential, an excellent stability and reducing the generation of sludge in a sealed tube test (paragraph [0001] of the patent application).

4.3 The closest prior art

The appellant, in its statements of ground of appeal (page 4, paragraph III.1), accepted the examining division's finding that D2 and in particular the compositions exemplified in examples 2-4 represent the closest prior art for the subject-matter of claim 1.

In the same way as the patent, D2 aims at providing stabilised refrigerating compositions having a low global warming potential (page 1, lines 16-24). The compositions exemplified in D2 are tested in a sealed tube test (see in particular examples 2-4). The board thus sees no reasons to deviate from the appellant's and examining division's position.

4.4 Distinguishing features

Examples 2-4 of D2 disclose compositions comprising inter alia a PAG, an allyl or butyl glycidyl epoxide in an amount of 1 or 2.5 wt.%, based on the amount of the base oil, and a mixture of trifluoroiodomethane (CF₃I) and HFO-1234yf (25:75 for example 2, 50:50 for examples 3-4).

The allyl or butyl glycidyl epoxide is a monoepoxy compound. The refrigerant HFO-1234yf is a tetrafluoropropene (see page 9, line 25-27 of D2) and corresponds to a refrigerant of formula (A).

The subject-matter of claim 1 at issue differs from the compositions of examples 2-4 of D2 in the type of PAG (the structure of the PAGs in D2 are not disclosed) and in the fact that the refrigerant of formula (A) of claim 1 is the only refrigerant.

4.5 Formulation of the technical problem

The appellant referred to the table attached to its statement setting out the grounds of appeal. This table contained three additional comparative examples 1-3 and examples 1 and 10 according to claim 1.

The compositions of examples 1 and 10 comprise i) a PAG as defined in claim 1, ii) 10 or 2 wt.% of an α -olefin oxide having 14 carbon atoms and iii) a refrigerant being HFC1234yf (a tetrafluoropropene of formula (A) according to present claim 1), whereas respective comparative examples 1 and 2 comprise a mixture of HFC1234yf and CF_3I . Comparative examples 1 and 2 represent the teaching of example 2 of D2.

Examples 1 and 10 achieve, when compared to comparative examples 1 and 2, an improved oil appearance ("Good" vs "Brown" or "Yellow"), an improved catalyst appearance ("Good" vs "Slight Color Change of Cu" or "Color Change of Cu"), an absence of sludge ("Absent" vs "Slightly present" or "present") and a reduced acid value ($0.01 >$ or 0.02 vs 0.16 or 0.35 mg KOH/g).

It is thus shown for two specific embodiments of claim 1 (examples 1 and 10) that superior properties are achieved. This beneficial effect is however not shown to be present over the entire scope claimed.

More specifically, the term "monoepoxy compound" used in claim 1 is broad and encompasses any compound having

only one epoxy group. Any structural modification of the monoepoxy compound is covered by claim 1 as long as the compound has only one epoxy group. The definition given in the description (paragraph [0030]) encompasses for instance any α -olefin oxide and any monoglycidyl ethers of alkylene glycols. The molecular weight of both monoepoxy compounds is not limited in claim 1 either.

It cannot be assumed that an α -olefin oxide having a long alkyl chain will have the same behaviour as the α -olefin oxide having 14 carbon atoms used in the above-discussed examples 1 and 10. The same finding applies with a PAG monoglycidyl ether (monoglycidyl ether of an alkylene glycol), wherein the PAG chain has a higher average molecular weight. The molecular weight or the average molecular weight is known to affect the oil solubility and, therefore, the effect of an additive.

Thus, for that reason, the results of the table filed with the statement setting out the grounds of appeal cannot be successfully relied on as evidence that the alleged improved performance in the sealed tube test is achieved by all the compositions encompassed by claim 1.

Consequently, the technical problem has to be formulated without taking into account the results set forth in the table annexed to the statement setting out the grounds of appeal.

The objective technical problem in view of D2 is therefore to provide an alternative method of lubricating a refrigerator using a refrigerant having a low global warming potential.

4.6 Obviousness of the solution

D2 teaches that certain hydrofluorocarbons (HFCs) may be used in combination with CF_3I provided that the resulting composition has a low global warming potential, see page 9, lines 20-25. Some unsaturated fluorinated hydrocarbon compounds are inter alia listed in D2 as preferred HFCs (page 9, line 29 to page 10, line 3): HFO-1234yf, HFO-1234ze (both being tetrafluoropropene), HFO-1225 (pentafluoropropene). All three refrigerants fall within formula (A) of claim 1.

The skilled person, faced with the technical problem of providing an alternative method of lubricating a refrigerator using a refrigerant having a low global warming potential, would consider any refrigerant exhibiting the required low global warming potential. The selection of an unsaturated fluorinated hydrocarbon as the only refrigerant from the preferred refrigerants disclosed in D2 to replace the trifluoroiodomethane does not therefore represent any inventive merit.

It has not been argued or shown that the type of PAG required by claim 1 leads to any unexpected technical effect. The selection of a PAG as required by claim 1 out of the PAGs referred to in general terms in D2 is hence arbitrary and has therefore no inventive merit either. Incidentally, it is noted that PAGs as required by claim 1 are known from D4 which discloses in examples 1 and 3 lubricating oil compositions comprising a PAG base oil which is a polypropylene glycol dimethyl ether (page 5, line 10).

4.7 For the reasons expressed above, the board comes to the conclusion that the subject-matter of claim 1 according

to auxiliary request 5 does not involve an inventive step.

5. Auxiliary request 6

5.1 Claim 1 according to auxiliary request 6 differs from claim 1 according to auxiliary request 5 in the definition of the monoepoxy compound. The monoepoxy compound is selected from hydrocarbyl monoglycidyl ethers having 6 to 16 carbon atoms and α -olefin oxides having 6 to 16 carbon atoms.

5.2 Article 123(2) EPC

The definition of the monoepoxy compound is based on the paragraph bridging pages 24 and 25 and the first full paragraph of page 25 of the application as filed, disclosing hydrocarbyl monoglycidyl ethers having 6 to 16 carbon atoms and α -olefin oxides having 6 to 16 carbon atoms as preferred monoepoxy compounds for use in the invention.

The remaining features of claim 1 (corresponding to the features of claim 1 according to auxiliary request 5) are based on the combination of originally filed claims 1 and 5 and paragraph [0012] of the application as filed.

The use of an unsaturated fluorinated hydrocarbon compound alone represents a single selection from the alternative refrigerants in originally filed claim 1.

Thus, the subject-matter of claim 1 according to auxiliary request 6 is directly and unambiguously disclosed in the application as filed. The amendments do not introduce subject-matter beyond the content of

the application as filed and fulfill the requirements of Article 123(2) EPC.

5.3 Article 84 EPC

The objection of lack of clarity regarding the amount of the monoepoxy compound in the main request and auxiliary requests 1 to 4 (2.1.2, *supra*) does not apply to present claim 1.

In present claim 1, a lubricant composition, comprising inter alia the monoepoxy compound, is used for a refrigerator. The lubricant composition used in the claim and the refrigerant are no longer parts of the same overall composition. If the lubricant composition comprises any further ingredient, there is no doubt that the further ingredient is part of the lubricant composition and the amount of the monoepoxy compound, based on the total amount of the whole lubricant composition, is thus clearly defined.

The claims according to auxiliary request 6 meet the requirements of Article 84 EPC.

5.4 Article 56 EPC

The monoepoxy compound in present claim 1 is restricted to hydrocarbyl monoglycidyl ethers having 6 to 16 carbon atoms and α -olefin oxides having 6 to 16 carbon atoms (5.1, *supra*).

5.4.1 Distinguishing features

The subject-matter of claim 1 of auxiliary request 6 differs from the compositions of examples 2-4 of D2 (point 4.4, *supra*) in the type of PAG (the structure of

the PAGs in D2 are not disclosed) and in the fact that the refrigerant of formula (A) of claim 1 is the only refrigerant.

5.4.2 Formulation of the technical problem

The issue that was key to inventive step of claim 1 according to auxiliary request 5 was that the effect shown in the table filed with the statement setting out the grounds of appeal was not achieved over the whole scope of claim 1 (4.5, *supra*).

The effect shown by the α -olefin oxide having 14 carbon atoms (table filed with the statement setting out the grounds of appeal, see 4.5, *supra*) can be credibly extrapolated to any α -olefin oxide having 6 to 16 carbon atoms, such olefin oxides exhibiting a similar chemical structure and being oil-soluble.

Table 2-1 of the application shows that the oil appearance, the catalyst appearance, the absence of sludge and the acid value achieved in the sealed tube test by the compositions of examples 4-6 comprising 10 wt.% of a 2-ethylhexyl glycidyl ether are the same as the ones achieved by compositions of examples 1-3 comprising the same amount of an α -olefin oxide having 14 carbon atoms. It can be therefore credibly concluded that the results obtained in table 1 for the α -olefin oxide having 14 carbon atoms can be transferred to hydrocarbyl monoglycidyl ethers having 6 to 16 carbon atoms.

Consequently, the board is convinced that the effect referred to in paragraph 4.5 above is achieved over the whole scope of claim 1.

Considering this, the objective technical problem in view of D2 is to provide a method of lubricating a refrigerator using a refrigerant having a low global warming potential and exhibiting an improved stability.

The solution proposed by claim 1 is to use the lubricating oil composition defined in the claim with an unsaturated fluorinated hydrocarbon alone as the refrigerant.

5.4.3 Obviousness of the solution

The solution is not obvious in view of the teaching of D2.

The board notes that, in the description, D2 (page 1, line 29 to page 2, line 6) teaches the skilled person that the presence of trifluoroiodomethane as present in example 2 of this document leads to stability problems. D2 therefore proposes to use this compound together with a stabilizer being a phenol compound or an epoxide compound. Accordingly, in example 2 of D2 the trifluoroiodomethane is combined with tocopherol and allyl glycidyl ether as the stabiliser. The latter corresponds to the monoepoxy compound of claim 1.

Based on the teaching of D2, the skilled person confronted with the problem of inter alia improving the stability of a refrigerant composition might have omitted the instable trifluoroiodomethane, but in that case would not necessarily have maintained the tocopherol/allyl glycidyl ether stabiliser which was no longer needed. He would thereby have arrived at a composition without any monoepoxy compound. As shown in table 2-4 of the application as filed, without any monoepoxy compound (denoted B1, B2 and B3 in the

table), the stability is impaired. More specifically, all examples of the invention which apply monoepoxy compound B1 and B2 have a good stability (good oil and catalyst appearance, absence of sludge formation and very low acid value). Contrary thereto, comparative examples 7 to 9 of table 2-4, which do not apply any monoepoxy compound, show an impaired stability (brown oil appearance, color change as regards catalyst appearance, sludge formation and rather high acid values). Consequently, the skilled person starting from example 2 and following the teaching in the above passage of D2 would not have arrived at the claimed subject-matter and would not have solved the objective technical problem. The claimed subject-matter is thus not obvious in view of D2.

Furthermore, none of the other documents cited by the examining division contains any hint that this problem can be solved by the use of compounds as defined in claim 1.

- 5.5 In view of these considerations, the board comes to the conclusion that the subject-matter of independent claim 1 and of claims 2-6, dependent on claim 1, involves an inventive step (Articles 52(1) and 56 EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division with the order to grant a patent with the following claims and a description to be adapted thereto:

Claims:

auxiliary request 6 received during oral proceedings of 24 April 2019.

The Registrar:

The Chairman:



N. Maslin

M. O. Müller

Decision electronically authenticated