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**Datasheet for the decision
of 17 December 2007**

Case Number: T 1209/05 - 3.3.01

Application Number: 99940626.7

Publication Number: 1129158

IPC: C10M 105/38

Language of the proceedings: EN

Title of invention:

Mixed esters of pentaerythritol for refrigeration base oils

Patentee:

Nippon Mitsubishi Oil Corporation

Opponent:

Imperial Chemical Industries PLC
Lubrizol Limited

Headword:

Refrigerator oil/NIPPON MITSUBISHI

Relevant legal provisions:

EPC Art. 54, 56, 114

Keyword:

"Main request: discretionary power of the first instance in
admitting late filed document - exercised in a reasonable way
(yes); novelty (no) - prior use"

"First auxiliary request: inventive step (yes)"

Decisions cited:

T 0534/89, T 0211/90, T 0017/91, T 0640/91, T 0039/93

Catchword:

-



Case Number: T 1209/05 - 3.3.01

DECISION
of the Technical Board of Appeal 3.3.01
of 17 December 2007

Appellant: Nippon Mitsubishi Oil Corporation
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Respondent 01: Imperial Chemical Industries PLC
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Respondent 02: Lubrizol Limited
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Representative: Mallalieu, Catherine Louise
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 4 July 2005
revoking European patent No. 1129158 pursuant
to Article 102(1) EPC 1973.

Composition of the Board:

Chairman: J. Jonk
Members: P. Ranguis
D. S. Rogers

Summary of Facts and Submissions

- I. The appellant (proprietor of the patent) lodged an appeal on 14 September 2005 against the decision of the opposition division posted on 4 July 2005 revoking the European patent No. 1 129 158 (European patent application No. 99 940 626.7).
- II. The European patent was filed on 2 September 1999 claiming a priority date of 2 September 1998 based on Japanese application No. 24 821 098.
- III. The decision of the opposition division was based on the set of claims as granted as main request and two amended sets of claims as first and second auxiliary requests both filed on 19 May 2005.

Claim 1 of the patent as granted read as follows:

"1. A refrigerator oil comprising an ester obtained from:
pentaerythritol; and
a carboxylic acid mixture comprising n-pentanoic acid in an amount of 20 to 50% by mass; n-heptanoic acid in an amount of 20 to 50% by mass and 3,5,5-trimethylhexanoic acid in an amount of 5 to 60% by mass, of the total amount of the carboxylic acid mixture."

Claim 1 of the first auxiliary request read as follows:

"1. A refrigerator oil comprising an ester obtained from:
pentaerythritol; and

a carboxylic acid mixture comprising n-pentanoic acid in an amount of 30 to 50% by mass; n-heptanoic acid in an amount of 20 to 50% by mass and 3,5,5-trimethylhexanoic acid in an amount of 5 to 30% by mass, of the total amount of the carboxylic acid mixture."

and

Claim 1 of the second auxiliary request corresponded to Claim 1 of the first auxiliary request, except that the refrigerator oil further comprised an alkyl glycidyl ester.

IV. The patent was opposed by opponent 01 (respondent 01) and opponent 02 (respondent 02). Both opponents sought revocation of the patent in suit for lack of novelty, due to public prior use, or lack of inventive step.

In support, the opponents cited numerous documents including:

- (1) News and information from ICI Synthetic Lubricants, October 1997. EMKARATE™ RL Polyol Esters For use in Ultra Low Temperature Refrigeration Applications,
- (2) Lubrizol Inter-Office Memorandum, Analysis of ICI ISO 22 and ISO 32 POE Samples, dated 5 December 1995,
- (7) Sales invoice No. 80007842 from ICI Americas Inc. to Virginia KMP, ship date 9 October 1996,
- (20) EP-A-0449406,
- (21) EP-A-0406479, and
- (22) EP-A-0501440.

V. Furthermore, having regard to a communication of the opposition division indicating its provisional opinion with respect to the issue of novelty in view of the alleged public prior use, opponent 02 submitted within the time limit settled by the opposition division the following additional documents:

(47) Declaration of D. Blackwell dated 17 May 2005
including

(47_a) dispatch to Lubrizol International Inc,
dated 23 June 1994,

(47_b) receipt by Lubrizol Corporation of
EMKARATE RL32H and RL22H, dated 30 June 1994,
and

(47_c) fax from Lubrizol International, Inc,
dated 13 May 1994,

(48) 1994 International CFC and Halon Alternatives
Conference, 24-26 October 1994, "The solubility of
refrigerants in synthetic lubricants and the
effect on viscosity", pages 3, 136-139 and 144,
R.W.Yost et al, and

(49) 1995 International CFC and Halon Alternatives
Conference and Exhibition, "The solubility of
refrigerant blends in synthetic polyol ester and
alkylbenzene refrigeration lubricants and the
effect on viscosity", pages 1 and 68-77,
C.L.Wellman and R.W.Yost.

VI. The opposition division, exercising its discretionary power under Article 114 EPC, admitted the documents (47) to (49) into the proceedings, since they were considered *prima facie* relevant for the issue of

novelty based on the alleged public prior use, and because they contained straight forward evidence which could be dealt with within the remaining time before the oral proceedings.

- VII. The opposition division held with respect to the main request that the subject-matter of claim 1 lacked novelty in view of the public prior use of the ICI commercial product Emkarate RL 32H.

Furthermore, the opposition division held with respect to the first auxiliary request that the subject-matter of claim 1 was novel, but lacked inventive step. Starting from the known commercial product Emkarate RL 32H as the closest prior art and in the absence of an improvement, the technical problem to be solved was the provision of an alternative to the product Emkarate RL 32H. Having regard to the teaching of documents (20) and (21) the use of i-nonanoic acid in the claimed amount in preparing the claimed ester was a common modification, which the skilled person in the art would have made exercising his normal tasks without involving an inventive step.

Concerning the subject-matter of claim 1 of the second auxiliary request, the opposition division held that it lacked an inventive step too, since it was well known that alkyl glycidyl esters could be used in synthetic refrigerant lubricants of the type of polyol esters in order to improve the stability of the lubricating oil.

- VIII. Oral proceedings took place on 17 December 2007. The Board was informed by letter of 9 November 2007 that the respondent 01 would attend the oral proceedings and

by letter of 16 November 2007 that a sub-power of attorney had been granted to the representative of the respondent 02.

IX. The appellant submitted the following arguments:

The documents (47) to (49) filed by opponent 02 after the issuing of the summons to oral proceedings before the opposition division should not be admitted into the proceedings in view of the generally accepted case law of the EPC (see, e.g. decisions T 17/91, T 534/89, T 211/90) indicating that late filed evidence relating to a public prior use by the opponent himself should not be admitted into the proceedings - irrespective of its relevance - because such conduct amounted to an abuse of proceedings. In fact, the sole reason put forward by the opponents for the late filing of said documents was the negative preliminary opinion of the opposition division. Furthermore, the time limit set according to Rule 71a in the summons to oral proceedings was not an invitation to the parties to present new documents (see decision T 39/93).

Concerning the novelty objection based on the prior use of Emkarate RL 32H the appellant essentially argued that the cited documents did not unambiguously prove that the composition of Emkarate RL 32H as indicated in document (2) had been consistently uniform over the time and that, therefore, it was not clear beyond reasonable doubts that the product disclosed in document (2) was available before the priority date of the patent.

Regarding inventive step with respect to the subject-matter of the first auxiliary request, the appellant considered that document (20) was the closest state of the art. Document (20) disclosed a lubricant for mixing with a 1,1,1,2-tetrafluoroethane refrigerant which comprised an ester of a viscosity of 2 to 30 mm²/s at 100°C, e.g. an ester of an aliphatic polyhydric alcohol and aliphatic monocarboxylic acid. Although, it was mentioned in said document that ester oils constituting lubricants might have straight or branched alkyl, there was no indication in it that the replacement of the straight chain C₉-acid in the ester oil 2 of example 1 by i-nonanoic acid (3,5,5-trimethylhexanoic acid), would result in an improved refrigerant miscibility and hydrolysis resistance. In this context, the appellant referred to a test report (document (61)) submitted on 6 December 2006. The results of the comparative experiments set out in said test report showed the improvements provided by the claimed ester oils compared to the closest prior art.

X. The respondents submitted in essence the following arguments:

The opposition division correctly exercised its discretion under Article 114 EPC in admitting the documents (47) to (49) into the proceedings.

Furthermore, documents (1), (7), (48) and (49) showed that the refrigerant lubricant Emkarate RL 32H was commercially available for use with HFC's before the priority date of the patent in suit, and document (2) showed that said ICI product had a composition falling within the scope of Claim 1 of the main request. They

concluded that the subject-matter of claim 1 of the main request was not novel in view of public prior use of the Emkarate RL 32H product.

Regarding inventive step of Claim 1 of the first auxiliary request, they submitted that the claimed invention did not provide any improvement compared to document (20) as the closest prior art. In fact, the replacement of n-heptanoic acid with i-heptanoic acid led to an ester oil having the same resistance to hydrolysis as the claimed ester oil and the difference in lubricity as measured by the Falex test was in that respect meaningless. In view of document (20), the claimed subject-matter amounted to a non-inventive selection from amongst an equally likely number of alternatives. Furthermore, in view of documents (21), (22) and

(59) International congress 21-22 October 1993, Proceedings, "Synthetic Lubricants for R134a - a replacement gas for R12", S.Corr et al

the person skilled in the art would have expected an improvement of both miscibility and hydrolysis resistance properties of polyol ester lubricants by substituting at least part of the linear acid content with a branched acid content. Even if the Board would admit that the improved properties provided by the exemplified oil of the patent in suit were unexpected, such an unpredictability of the properties rendered not credible any generalization of the alleged improvement.

XI. The appellant requested that the decision under appeal be set aside and that the patent be maintained as

granted or upon the basis of the first or second auxiliary requests submitted on 19 May 2005 before the opposition division. The appellant further requested not to admit documents (47) to (49) into the proceedings.

The respondents requested that the appeal be dismissed.

XII. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.
2. *Admissibility of late-filed evidence*
 - 2.1 Using its discretionary power under Article 114(1) EPC, the opposition division decided to admit documents (47) to (49) filed by the opponent 02 in response to the communication according to Rule 71a EPC 1973 (Rule 116 EPC 2000) and before the expiry of the time limit set therein, despite the objection of the proprietor of the patent.
 - 2.2 According to the case law of the Boards of Appeal the discretionary power conferred by Article 114 EPC implies necessarily that the department of first instance of the EPO must have a certain degree of freedom in exercising its power. A Board of Appeal should only overrule the way in which a first instance department has exercised its discretion if the Board comes to the conclusion that the first instance department in its decision has exercised its discretion

- according to the wrong principles, or without taking into account the right principles, or
- in an unreasonable way

(see T 640/91, OJ EPO 1994, 918, point 6.3).

Furthermore, contrary to the appellant's view, the communication under Rule 71a EPC (1973) does not forbid the parties to present new facts and evidence, provided that they are submitted before the fixed time limit, as was actually the case here. The sole condition is that the new facts or evidence do not depart from the legal and factual framework of the issues and grounds pleaded and evidenced throughout the opposition (see T 39/93, OJ EPO 1997, 134, point 3.3).

2.3 Documents (47) to (49) were cited in relation to the objection of prior use already substantiated in the statement of grounds of opposition and the teaching of these does not deviate from the line of argumentation sustained by the parties throughout the opposition proceedings. Moreover, the opposition division found that said documents were *prima facie* relevant and that they contained straight forward evidence, which could be dealt with within the remaining time before the oral proceedings.

2.4 Thus, in view of these considerations, the Board concludes that the opposition division has exercised its discretionary power according to the right principles and in a reasonable way so that there is no reason for the Board to overrule its decision.

2.5 In this context, the Board observes that the three decisions cited by the appellant in support of his submissions not to introduce said documents into the proceedings, namely, T 17/91, T 534/89 and T 211/90, all relate to a different situation wherein the objections of prior use were submitted after the expiry of the opposition period. These decisions are, therefore, not relevant for the present case.

2.6 Therefore, the request of the appellant not to admit documents (47) to (49) into the proceedings is rejected.

Main request

3. *Novelty*

3.1 The question to be dealt with in this respect is whether the claimed subject-matter of claim 1 as granted lacks novelty in view of public prior use based on the commercial ICI product Emkarate RL 32H.

3.2 Having regard to documents (1), (7), (48) and (49) the Board concludes that Emkarate RL 32H was available to the public as a commercial product before the priority date of the patent in suit of 2 September 1998 for the following reasons:

Document (1), published in October 1997, discloses that Emkarate RL 32H is a commercial product of ICI, which can be used in ultra low temperature refrigeration applications (see page 1 with respect to the Emkarate product line and page 1, right column, concerning the viscosity of Emkarate RL 32H). It also discloses that the Emkarate RL product line of ICI can be purchased by

calling Virginia KPM as one of the distributors (see page 2, right column).

Furthermore, several sales invoices (see e.g. document (7)), all dated in 1996, show that ICI has sold Emkarate RL 32H to its distributor Virginia KPM mentioned in said document (1).

Furthermore, Documents (48) and (49), published in October 1994 and October 1995, respectively, confirm that Emkarate RL 32H was publicly available to the public before the priority date of the patent in suit, since they disclose that said product, which according to both documents were used for comparing the viscosity grades of a number of ICI Emkarate RL refrigeration lubricants, had been commercially obtained (see document (48), page 137, third paragraph; and document (49), page 69, fifth paragraph). Moreover, both documents disclose that the tested Emkarate RL 32H product had the following viscosity data

a viscosity at 40°C of 33.7,
a viscosity at 100°C of 5.9, and
a viscosity index of 120

(see document (48), page 138, Table 1; and document (49), page 71, Table 1).

3.3 Having regard to document (2) in combination with documents (47), (47a), (47b), (47c), (63) and (63a), the Board also concludes that the ICI Emkarate RL 32H product has a composition falling under the scope of present claim 1 of the patent in suit as granted for the following reasons:

Document (2), which is an internal report of Lubrizol dated 12 May 1995 and relates to "Analysis of ICI ISO 22 and ISO 32 POE Samples", discloses that the ICI product Emkarate RL 32H has the following composition (see Table 3):

Acid substituent	ICI Emkarate RL 32H (requested by JWGE) (1138-34912) (RR# 49874)
n-pentanoic	35%
n-heptanoic	33%
i-octanoic	
i-nonanoic	32%

and the following physical properties (see Table 2):

Analytical test	ICI Emkarate RL 32H (requested by JWGE) (1138-34912) (RR# 49874)
Viscosity 40°C	32.81
100°C	5.81
Viscosity Index (D2270)	120
TAN (mg KOH/g) (D974)	0.04
Elemental Analysis (ppm, 1070B)	nil
20% Miscibility Haze PL (R-134a) Cloud Pl	-35 -40

Concerning the disclosure of this document, the appellant accepted that the term MPE in said first paragraph of page 2 is an abbreviation for monopentaerythritol, that the term i-nonanoic in said Table 3 stands for 3,5,5-trimethylhexanoic acid, and that the percentages in said Table 3 are moles percents, so that by converting these values into mass % the composition of Emkarate RL 32H as disclosed in document (2) had the following composition:

n-pentanoic 27.6 mass %
n-heptanoic 33.2 mass %
i-nonanoic 39.2 mass %.

Furthermore, document (2) also discloses that the ICI ISO 32 fluids are MPE esters which do not contain phosphorus, that the RL 32S sample has a slightly lower viscosity than the RL 32H material, and that the miscibility of the RL 32S is poor relative to the sample received via D.J. Blackwell (LZ Australia) (see page 2, first paragraph).

Concerning the indication in document (2) that the tested sample of Emkarate RL 32H had been received via D.J. Blackwell (LZ Australia), that it was requested by J.W. Gemmel (JWGE) (see Tables 2 and 3) and that it had the receiving report number #49847 (see also Tables 2 and 3), the respondents provided as additional explanatory evidence a declaration dated 17 May 2005 (document (47)) of D.J. Blackwell, an employee of The Lubrizol Corporation, working in Australia, and a declaration dated 16 November 2007 (document 63) of G.R. Malone, an employee of The Lubrizol Corporation living

in Wickliffe, Ohio, being responsible for analysing competitive products.

In his declaration (document 47)) D.J. Blackwell has stated that he provided himself with sample of ICI Emkarate RL 32 back in 1994, that the sample was shipped to The Lubrizol Corporation in Wickliffe on 23 June 1994, and that it was received in Wickliffe on 29 June 1994. To his declaration three Annexes had been added for confirmation, namely

- Annex 3 (document 47c) a facsimile dated 13 May 1994 from D.J. Blackwell to J. Gemel indicating that he had requested samples of Emkarate RL 32H and Emkarate RL 22H, that said materials would be shipped to the attention of J. Gemel, and that James N. Kirby is one of the distributors for ICI Emkarate products in Australia;
- Annex 1 (document 47a) a facsimile from Lubrizol (Australasia) dated 23 June 1994 to J. Gemel indicating the shipment of the samples for testing purposes; and
- Annex 2 (document 47b) a facsimile dated 30 June 1994 from J.W. Gemel to D.J. Blackwell confirming the receipt of Emkarate RL 32H in Wickliffe and indicating that they would be forwarded to GRM (G.R. Malone) for chemical analysis.

According to the declaration of G.R. Malone (document (63)) the Emkarate RL 32H and Emkarate RL 22H samples

had been received by the Lubrizol's Shipping and Receiving Department on June 28 1994 and that they had been forwarded to J.W. Gemel, the Operations Manager for the SRL Business Unit, on 29 June 1994. As an Annex to this declaration Mr. Malone provided a copy of the receiving report dated 28 June 1994 (document 63a) indicating #49847 as the receiving report number, which has also been indicated in Tables 2 and 3 of document (2).

Thus, this additional explanatory evidence as a whole clearly shows that the sample of the ICI product Emkarate RL 32H disclosed in document (2) has been obtained by Mr. Blackwell as an employee of Lubrizol before the priority date without any obligation of secrecy, that the same sample was analysed and that the results of the analysis has been summarised in Table 3 of document (2).

3.4 In the context of this issue of public prior use, the Board notes that the Appellant's contention that the analysed Emkarate RL 32H product of document (2) having viscosity data indicated in Table 2 (see point 3.3 above) would differ from the commercial Emkarate RL 32H products used according to documents (48) and (49) having the viscosity data indicated in Table 1 of each document (see point 3.2 above) cannot be accepted by the Board, since the differences between these data are so small, that they fall within the margin of error of their measurements.

3.5 Thus having regard to these considerations the Board concludes, that the subject-matter of Claim 1 of this request lacks novelty in view of the public prior used

of the ICI Emkarate RL 32H product, and that, therefore, the present main request is not allowable.

First auxiliary request

4. *Amendments*

4.1 With respect to Claim 1 as granted, Claim 1 of the first auxiliary request differs in that the amount of n-pentanoic acid was 30 to 50% by weight and the amount of 3,5,5-trimethylhexanoic acid was 5 to 30% by weight. Support can be found in the patent as granted on page 3, lines 4 and 19 and in the application as originally filed on page 4, line 14 and page 5, line 17.

Claims 2 and 4 as granted were modified accordingly. Claim 5 was rendered dependent of Claim 1 only, instead of Claims 1 to 4 as in the granted version. Claims 6 to 9 were not amended.

There is thus no objection under Article 123(2) EPC.

4.2 Since the amendments bring about a restriction of the scope of protection conferred by the patent in suit, it is also in conformity with the requirements of Article 123(3) EPC.

5. *Inventive step*

5.1 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully

- solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures the assessment of inventive step on an objective basis and avoids an ex post facto analysis.
- 5.2 The closest prior art is normally a prior art document disclosing subject-matter aiming at the same objectives as the claimed invention and having the most relevant technical features in common (see Case Law of the Boards of appeal, Edition 2006, I.D.3.2).
- 5.3 Having regard to the subject-matter of claim 1 of this request the Board considers, in agreement with the parties to the proceedings, that document (20) represents the closest prior art.
- 5.4 Document (20) discloses a lubricant oil suitable for use with 1,1,1,2-tetrafluoroethane refrigerant having a wide compatibility temperature range with the refrigerant, having no corrosive effect on refrigerating equipment, showing no reduction in insulating property, having high stability to the refrigerant and thermal stability and improving the wear-resistance property of the equipment components (see page 3, lines 37 to 40). The lubricating oil used for admixture with 1,1,1,2-tetrafluoroethane refrigerant is an ester having a viscosity at 100°C of between 2 and 30 mm²/s (see page 3, lines 37 to 42), whereby said ester can be selected from several types of esters (see page 3, lines 45 to 48, and claims 2 to 5), and can be, for instance, an ester of a polyol and an aliphatic straight chain or branched chain carboxylic acid (see page 4, line 35).

Preferred esters of an aliphatic polyol and a straight chain or branched chain carboxylic acid are, e.g., those prepared from pentaerythritol, dipentaerythritol or tripentaerythritol, and a fatty acid having 5 to 12, or more preferably 5 to 7 carbon atoms, e.g. valeric, hexanoic, heptanoic, 2-methylhexanoic, 2-ethylhexanoic, isooctanoic, isononanoic, isodecanoic, 2,2'-di-methyloctanoic or 2-butyloctanoic acid (see page 4, lines 47 to 50).

The document also discloses, as one of numerous examples, an ester oil obtained from pentaerythritol and a straight chain C₅-C₉ acid mixture consisting of a C₅ acid component in an amount of 30 wt%, a C₇ acid component in an amount of 40 wt% and a C₉ acid component in an amount of 30 wt% (see page 7, lines 44 to 47, the specimen oil 2).

Thus, in view of this disclosure, the Board concludes that the subject-matter of present claim 1 is encompassed by the scope of the disclosure of document (20), but does not lack novelty as suggested by the respondents during the oral proceedings before the Board, since in order to arrive at an ester oil falling under the scope of present claim 1 of the patent in suit it would be necessary (i) to select a specific type of ester (see the first paragraph under this point 5.4), (ii) to make selections from two lists of starting substances indicated in said document for preparing the selected type of ester, namely from a list of polyols and a list of acids, (iii) to combine a selected polyol with a specific combination of selected straight and branched acids and (iv) to apply the

selected acids in a specific ratio not indicated in said document and because any incentive to make these selections fails.

5.5 The appellant submitted by referring to a test report (document (61)) that, compared to this prior art, a refrigerator oil as now claimed according to the patent in suit showed an improved hydrolysis resistance and also an improved lubricity.

According to said test report tested esters of pentaerythritol have the following acid components:

Fatty acid	n-C ₅ acid	i-C ₅ acid	n-C ₇ acid	i-C ₇ acid	n-C ₉ acid	i-C ₉ acid
Example 1 patent in suit	40%	-	40%	-	-	20%
Example 1 doc (20) oil 2	30%	-	40%	-	30%	-
Example 1 doc (20) (modified)	40%	-	40%	-	20%	

and

these tested pentaerythritol esters gave the following effects:

	Example 1 patent in suit	Example 1 doc (20) oil 2	Example 1 doc (20) (modified)
Kinematic visc 40°C (mm ² /s)	28.5	22.5	20.6
Kinematic visc	5.5	4.75	4.44

100°C (mm ² /s)			
TAV (mgKOH/g)	0.01	0.01	0.01
Hydroxyl value (mgKOH/g)	0.9	0.8	0.9
Upper critical value °C	-35	-25	-28
Volume resistivity (10 ¹⁴ Ω cm)	8.7	5.2	6.7
Heat stability test appearance of the sample oil	no change	no change	no change
Heat stability test appearance of catalyst	no change	Glossy reduced	Glossy reduced
Volume resistivity (10 ¹⁴ Ω cm)	5.4	4.7	5.8
TAV (mgKOH/g)	0.02	0.03	0.03
Falex test amount of journal worn (mg)	13	17	19
Hydrolysis resistance TAV (mgKOH/g) 175°C, 168h	0.05	1.02	1.13
Hydrolysis resistance TAV (mgKOH/g) 175°C, 336h	1.57	2.78	2.91

These test results show that the refrigerator oil of example 1 of the patent in suit provided an improved resistance to hydrolysis compared to oil 2 of document (20) and also compared to said oil 2 modified in order

to show the technical effect of the sole distinguishing feature, namely the replacement of n-nonanoic acid by i-nonanoic acid, while maintaining the ratio of the acids (see also T 197/86, OJ EPO 1989, 371, point 6.1.3, concerning prerequisites of comparative test). Moreover, the indicated test results achieved by the Falex test show that the oil of example 1 also has an improved lubricity.

5.6 Therefore, the technical problem underlying the patent in suit in the light of the closest prior art can be seen in the provision of a refrigerator oil having an improved resistance to hydrolysis and a better lubricity, while maintaining satisfactory and well-balanced other performances including heat stability, upper critical temperature (refrigerant miscibility) and volume resistivity (electric insulating ability). This technical problem is in line with the objectives set out in the patent in suit (see page 2, paragraph [0001] and page 9, paragraphs [0053] and [0054]).

5.7 As the solution to this problem the patent in suit proposes a refrigerant oil comprising an ester oil according to present claim 1, which is obtained from pentaerythritol and a carboxylic acid mixture comprising n-pentanoic acid in an amount of 30 to 50% by mass; n-heptanoic acid in an amount of 20 to 50% by mass and 3,5,5-trimethylhexanoic acid in an amount of 5 to 30% by mass, of the total amount of the carboxylic acid mixture.

Having regard to the test report (document (61)) submitted by the appellant and showing the test results indicated above under point 5.5, the alleged

- improvements over the closest prior art have been successfully demonstrated and, therefore, the Board finds it credible that the technical problem as defined above is solved for the whole scope of present claim 1 in view of its narrow scope.
- 5.8 In this context, the respondents argued that it was not credible that the technical problem has been solved for all the compositions encompassed by Claim 1 due to the unpredictability of the effects obtained in this technical field and the fact that the comparative tests were solely based on one ester oil, namely that of example 1. However, under the circumstances of the present case the burden of proof for showing the rightness of this contention rests with the respondents. Therefore, in the absence of any support for the respondents' allegations and given the Board's findings indicated in the preceding paragraph 5.7, the Board does not accept this argumentation.
- 5.9 It remains to be decided whether or not the claimed solution to the problem underlying the patent in suit is obvious in view of the state of the art taken as a whole.
- 5.10 Document (20) discloses, as indicated under point 5.4 above, a refrigerator oil, which comprises an ester obtained from a polyol and an aliphatic straight chain or branched chain carboxylic acid, but it does not provide any pointer to the skilled person to select an ester as defined in present claim 1.
- 5.11 In this context, the respondents submitted, that it was well known in the prior art, that the use of polyol

ester oils obtained from branched chain aliphatic carboxylic acids, possibly in mixture with straight chain fatty acids, are preferred, since they provide improved properties like a high hydrolytic stability and a good compatibility with the refrigerant, an improved pour point and/or a high viscosity (see document (59), Figure 5; document (20), page 5, lines 56 to 58; document (21), page 4, lines 30 to 34; document (22), page 4, lines 12 to 14). Therefore, starting from document (20), the person skilled in the art would have had a clear guidance to modify the oil 2 of example 1 by replacing at least a part of the straight chain fatty acids by a branched chain fatty acid.

5.12 On the other hand, the appellant contested this submission and referred to further comparative tests set out in document (61) giving the following results:

Applied pentaerythritol esters:

Fatty acid	n-C5 acid	i-C5 acid	n-C7 acid	i-C7 acid	n-C9 acid	i-C9 acid
Example 1 patent in suit	40%	-	40%	-	-	20%
Comparative Example 7	20%	20%	40%	-	20%	-
Comparative Example 8	40%	-	20%	20%	20%	-
Comparative Example 9	40%	-	-	40%	20%	-
Emkarate RL	28%	-	33%	-	-	39%

32H

Effects of these pentaerythritol esters:

	Example 1 patent in suit	Comparative Example 7	Comparative Example 8	Comparative Example 9	Emkarate RL 32H
Kinematic visc 40°C (mm ² /s)	28.5	20.8	21.3	22.2	32.8
Kinematic visc 100°C (mm ² /s)	5.5	4.45	4.47	4.4	5.51
TAV (mgKOH/g)	0.01	0.01	0.01	0.01	0.01
Hydroxyl value (mgKOH/g)	0.9	1.0	1.1	0.9	1.0
Upper critical value °C	-35	-29	-31	-32	-30
Volume resistivity (10 ¹⁴ Ω cm)	8.7	5.5	3.9	4.8	4.2
Heat stability test appearance of the sample oil	no change	no change	no change	no change	no change
Heat stability test appearance of catalyst	no change	Glossy reduced	Glossy reduced	Glossy reduced	Glossy reduced
Volume resistivity (10 ¹⁴ Ω cm)	5.4	4.5	2.8	3.5	3.8
TAV (mgKOH/g)	0.02	0.02	0.02	0.03	0.02
Falex test amount of journal worn (mg)	13	24	25	29	18
Hydrolysis resistance TAV (mgKOH/g) 175°C, 168 h	0.05	0.58	0.29	0.08	0.08
Hydrolysis resistance TAV (mgKOH/g) 175°C, 336 h	1.57	1.72	1.65	1.42	1.63

The comparative examples 7, 8 show that the partial replacement (50/50) of n-pentanoic acid with i-pentanoic acid and the partial replacement (50/50) of n-heptanoic acid with i-heptanoic acid with respect to example 1 of the patent in suit significantly reduces the resistance to hydrolysis and the lubricity (Falex test) and, therefore, that the use of n-pentanoic acid and n-heptanoic acid is an essential feature of the claimed invention. Moreover, comparative example 9 shows that with respect to example 1 of the patent in suit the replacement of n-heptanoic acid by i-heptanoic acid instead of the replacement of n-nonanoic acid by i-nonanoic acid strongly reduces the lubricity properties as measured by the Falex test. Furthermore, the comparison with the ICI product Emkarate RL 32H shows that said commercial product has inferior lubricity properties and that the amount of i-nonanoic used is also an essential feature of the claimed invention.

- 5.13 Having regard to these test results showing the importance of the specific selection of the acid components and their ratio, and in view of the considerations above, the Board concludes that the subject-matter of present claim 1 of this request represents a purposive and non-obvious selection from the teaching of document (20), and therefore involves an inventive step within the meaning of Article 56 EPC.

The same applies to dependent claims 2 to 8 representing particular embodiments of Claim 1 and claim 9 relating to a fluid composition for refrigerators comprising the refrigerator oil according

to any of claims 1 to 8 and a chlorine-free fluorocarbon.

Second auxiliary request

6. The preceding first auxiliary request being allowable for the reasons set out above, there is no need for the Board to decide on this request.

Remittal to the first instance (Article 111(1) EPC)

7. Having so decided, the Board has not, however, taken a decision on the whole matter, since amendments to the description are required in order to bring it into conformity with the claims of the present first auxiliary request. Therefore, and having regard to the fact that the function of the Boards of Appeal is primarily to give a judicial decision upon the correctness of the earlier decision taken by the first instance, the Board exercises its discretion under Article 111(1) EPC to remit the case to the first instance for the sole purpose of properly adapting the description of the patent in suit to the claims of the first auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent upon the basis of claims 1 to 9 of the first auxiliary request submitted on 19 May 2005, with a description to be adapted thereto.

The Registrar

The Chairman

N. Maslin

J. Jonk