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Datasheet for the decision of 7 July 2017

Case Number: T 0903/12 - 3.3.01

Application Number: 04256985.5

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IPC: C10M169/04, C10M161/00

Language of the proceedings: EN

Title of invention:
Lubricating oil compositions

Applicant:
Infineum International Limited

Headword:
Lubricant for diesel engines/INFINEUM

Relevant legal provisions:
EPC Art. 84, 56

Keyword:
Clarity - main request (no)
Inventive step - auxiliary requests 1 to 3 (no)
Remittal to the examining division - auxiliary request 4 (yes)

Decisions cited:

Catchword:

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Case Number: T 0903/12 - 3.3.01

D E C I S I O N
of Technical Board of Appeal 3.3.01
of 7 July 2017

Appellant: (Applicant)	Infineum International Limited P.O. Box 1, Milton Hill Abingdon, Oxfordshire OX13 6BB (GB)
Representative:	Goddard, Frances Anna Infineum UK Limited PO Box 1 Milton Hill Abingdon, Oxfordshire OX13 6BB (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 21 June 2011 refusing European patent application No. 04256985.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	A. Lindner
Members:	J. Molina de Alba
	M. Blasi

Summary of Facts and Submissions

I. The present appeal lies from the decision of the examining division posted on 21 June 2011 refusing European patent application No. 04 256 985.5.

II. The following documents cited during the examination and appeal proceedings, are referred to below:

(4) US-B-6187721

(5) EP-A-1318189

(6) Chemistry and technology of lubricants, Mortier R.M. and Orszulik S.T., (Ed.), 1992 Blackie Academic & Professional, 72-77

III. The decision under appeal was based on the main request, with claims 1 and 2 filed on 15 February 2008 and claims 3 to 13 filed on 28 April 2011, and the auxiliary request filed during the oral proceedings of 4 May 2011. In its decision, the examining division found that claim 1 of the main request lacked clarity and that the subject-matter of claim 1 of the auxiliary request lacked inventive step over the combination of the teachings of documents (4) and (5).

The lack of clarity objection was directed to the feature in claim 1 of the main request "*1.3 to 1.7 mono- or dicarboxylic acid producing moieties per polyalkenyl moiety*", based on the fact that a moiety containing two carboxylic acid producing moieties could be counted either as one dicarboxylic acid producing moiety or as two monocarboxylic acid producing moieties.

In its analysis of inventive step, the examining division identified document (4) as the closest prior art. This document was directed to the same technical problem as the application, namely the provision of a lubricating oil composition with improved lubricant performance in highly sooted environments. The composition of claim 1 was found to differ therefrom in the nature and higher concentration of its dispersant. In the absence of comparative tests, the examining division defined the problem to be solved as the provision of an alternative lubricating oil composition. This problem was considered to be solved by claim 1 of the auxiliary request in an obvious manner in view of document (5), which disclosed the advantageous soot dispersion properties of the dispersant defined in said claim 1 when used in lubricating oil compositions for diesel engines.

IV. With the statement of grounds of appeal, the appellant (applicant) requested that the decision at issue be set aside and that a patent be granted on the basis of the main request or one of the sets of claims filed as auxiliary requests 1 to 8 therewith. In addition, it filed comparative tests to show that the claimed compositions minimised the soot-induced viscosity increase in lubricating oils.

V. In its preliminary opinion, sent as annex to the summons to oral proceedings, the board concurred with the arguments of lack of clarity and inventive step set out in the appealed decision and noted that the comparative tests filed with the statement of grounds of appeal were not conclusive.

VI. With letter dated 31 May 2017, the appellant filed sets of claims as auxiliary requests 9 to 12.

VII. Oral proceedings were held before the board on 7 July 2017. In the course of these proceedings, the appellant filed a set of claims of a new main request and of auxiliary request 4, and renumbered previous auxiliary requests 10 to 12 as auxiliary requests 1 to 3 respectively. All other requests were withdrawn.

Claim 1 of the main request, filed at the oral proceedings before the board, reads as follows:

"1. A lubricating oil composition comprising a major amount of at least one of a Group I, Group II Group III mineral oil of lubricating viscosity, or a mixture thereof; a minor amount of one or more polymers having a molecular weight between 2,000 and 12,000,000, comprising olefin copolymers containing at least one moiety selected from alkyl amine, alkyl amide, aryl amine or aryl amide groups, nitrogen-containing heterocyclic groups or ester linkages, the olefin copolymer providing from 0.0003 to 0.008 wt% of nitrogen to the lubricating oil composition; and a minor amount of dispersant comprising one or more nitrogen-containing dispersants that are the reaction product of a polymeric hydrocarbon, which is a polyalkene, functionalised with a functional moiety, which functional moiety is a mono- or dicarboxylic acid, anhydride or ester, and a polyamine; at least one of the nitrogen-containing dispersants having a polyalkenyl moiety with a number average molecular weight of at least 1800, and from 1.3 to 1.7 functional moieties per polyalkenyl moiety; the dispersant contributing at least 0.08 wt.% of nitrogen to the lubricating oil composition."

Claim 1 of auxiliary request 1, filed on 31 May 2017 as auxiliary request 10, is based on claim 1 of the main request, from which references to mono-carboxylic acids have been removed and wherein the feature "*the olefin copolymer providing from 0.0003 to 0.008 wt.% of nitrogen to the lubricant oil composition*" has been inserted.

Claim 1 of auxiliary request 2, filed on 31 May 2017 as auxiliary request 11, corresponds to claim 1 of auxiliary request 1, with the further limitation that the dispersant is "*at least one polyalkenyl succinimide dispersant which is the reaction product of a polyalkenyl substituted succinic anhydride and a polyamine, and has a coupling ratio of from 0.65 to 1.25*".

Claim 1 of auxiliary request 3, filed on 31 May 2017 as auxiliary request 12, corresponds to claim 1 of auxiliary request 2, with the additional limitation that the dispersant polyalkenyl moiety had "*a molecular weight distribution (M_w/M_n) of from about 1.5 to about 2*".

Claim 1 of auxiliary request 4, filed at the oral proceedings before the board, corresponds to claim 1 of auxiliary request 3, with three further limitations, namely that the olefin copolymer had a molecular weight of "*between 20,000 and 750,000*" and comprised "*an ethylene-propylene copolymer grafted with maleic anhydride and derivatised with an aryl amine*", and that the dispersant polyalkenyl moiety had a molecular weight of "*from 1800 to 3000*".

VIII. The appellant's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

Regarding the clarity of the feature "*1.3 to 1.7 mono or dicarboxylic acid producing moieties per polyalkenyl moiety*" in claim 1 of the main request, the appellant submitted that the disclosure of the dispersants according to the invention on pages 14 to 17 of the description made it clear that the ratio of mono- or dicarboxylic acid producing moieties to polyalkenyl moieties did not refer to the ratio of carboxylic acid moieties to polyalkenyl moieties but rather to the ratio of functional groups per polyalkenyl backbone. This argument was supplemented with references to the illustration filed with the statement of grounds of appeal and to figure 3.14 in document (6) which, in the appellant's opinion, showed that the type of functional group was not relevant to the ratio of functional groups to polymer backbone.

In its analysis of inventive step, the appellant concurred with the examining division that document (4) was the closest prior art and that the technical problem underlying the invention was the provision of an alternative lubricating oil composition. The appellant disputed however that the composition defined in claim 1 of auxiliary request 1 was an obvious solution to said problem. In particular, the appellant argued that the requirement in claim 1 of auxiliary request 1 that the nitrogen-containing dispersant was in an amount contributing at least 0.08 wt.% nitrogen to the composition implicitly required a dispersant concentration of above 5 wt.%. This would be apparent from oils A and E on page 4 of the statement of grounds of appeal, where a concentration of 5 wt.% dispersant contributed only 0.06 wt.% nitrogen to the lubricant. For this reason, considering that document (4) taught that the amount of dispersant in the lubricant should

not exceed 4 wt.% because this could cause undesirable effects (see column 1, lines 43 to 57 and column 2, lines 14 to 16 and 24 to 29), the combination of documents (4) and (5) would not have led the skilled person to compositions with the dispersant concentration defined in claim 1.

With respect to the inventive step of the composition in claim 1 of auxiliary requests 2 and 3, the appellant submitted that their further limited scopes made it more credible that the effect shown arose across the whole scope of claim 1.

Concerning the admission of auxiliary request 4, the appellant noted that the latter had been filed with the intention of overcoming the board's objection of lack of inventive step by imposing further limitations on the olefin copolymer and the dispersant.

IX. The final appellant's requests were as follows:

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request filed at the oral proceedings before the board on 7 July 2017, or alternatively, of one of auxiliary requests 1 to 3 filed as auxiliary requests 10 to 12 with letter dated 31 May 2017, or in the further alternative, of auxiliary request 4 filed at the oral proceedings before the board on 7 July 2017.

X. At the end of the oral proceedings, the board's decision was announced.

Reasons for the Decision

1. The appeal is admissible.

2. *Admission of the main request and auxiliary requests 1 to 3 – Article 13(1), (3) RPBA*

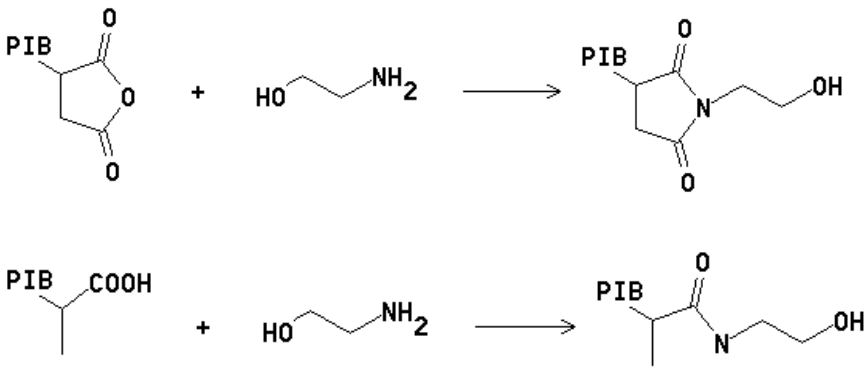
The main request and auxiliary requests 1 to 3 essentially correspond to auxiliary requests 9 to 12 filed with letter of 31 May 2017 respectively. By filing these requests and withdrawing all previous requests, the appellant simplified the procedure without introducing new formal or substantive issues. In view of this, the board decided to admit the requests for procedural economy.

3. *Clarity of claim 1 of the main request – Article 84 EPC*

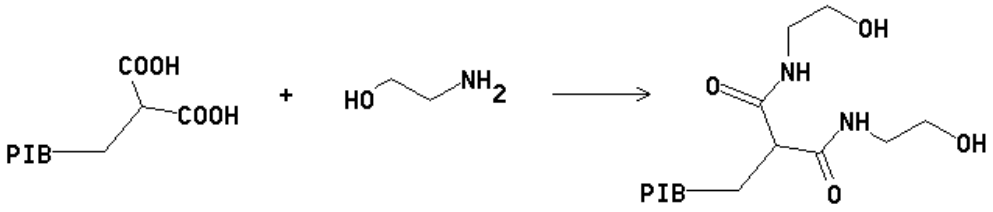
The board concurs with the examining division that the feature in claim 1 "*from 1.3 to 1.7 functional moieties per polyalkenyl moiety*", wherein a functional moiety is defined as "*a mono- or dicarboxylic acid, anhydride or ester*", is unclear because a functional moiety which contains two carboxylic groups may be counted either as one functional moiety (i.e. one dicarboxylic acid) or as two moieties (i.e. two monocarboxylic acids).

Regarding this objection, the appellant replied that the number of functional moieties referred to in claim 1 was independent of the fact that the moiety is a dicarboxylic or a monocarboxylic acid. As proof thereof, it drew attention to the examples below (see scheme filed with the statement of grounds of appeal and figure 3.14 in document (6)), where functional moieties derived from succinic acid (dicarboxylic) or

propanoic acid (monocarboxylic) resulted in a single functional group:



In the board's judgement, however, this argument is not valid because it is based on a specific case where the dicarboxylic acid forms a cyclic imide. By contrast, dicarboxylic acids do not generally form cyclic imides upon reaction with amines and, in such cases, they result in two amide groups rather than one. An example thereof is the case of the analogue derived from methylenemalonic acid depicted below.



Hence, claim 1 of the main request lacks clarity.

4. Inventive step of the subject-matter of claim 1 of auxiliary request 1 – Article 56 EPC

4.1 The present application is directed to a lubricating oil composition for commercial diesel engines which provides better soot dispersion, thereby reducing the viscosity increase caused by soot (see page 2, lines

13-18). The composition in claim 1 of auxiliary request 1 contains three components:

(a) a Group I, Group II and/or Group III mineral oil of lubricating viscosity;

(b) one or more olefin copolymers containing at least one moiety selected from alkyl amine, alkyl amide, aryl amine or aryl amide groups, nitrogen-containing heterocyclic groups or ester linkages, the olefin copolymer having a molecular weight between 2,000 and 12,000,000 and providing from 0.0003 to 0.008 wt% of nitrogen to the lubricating oil composition; and

(c) one or more nitrogen-containing dispersants that are the reaction product of a polyalkenyl-substituted dicarboxylic acid, anhydride or ester, and a polyamine; at least one of the nitrogen-containing dispersants having a polyalkenyl moiety with a number average molecular weight of at least 1800, and from 1.3 to 1.7 functional moieties per polyalkenyl moiety; the dispersant contributing at least 0.08 wt.% of nitrogen to the lubricating oil composition.

4.2 The board, in agreement with the appellant and the examining division, considers that document (4) represents the closest prior art. This document teaches a lubricating oil composition aimed at solving the same problem as the application (see document (4), column 1, lines 64 to column 2, line 7) and containing the same three basic components (see document (4), claim 1), namely: (a) a lubricant base stock; (b) a nitrogen-functionalised olefin copolymer as in present claim 1

(also called viscosity index improver); and (c) a dispersant.

4.3 The appellant and the examining division defined the technical problem underlying the invention as the provision of an alternative lubricating oil composition. The board sees no reason to differ.

As the solution to this problem, claim 1 proposes a lubricating oil composition which contains a specific nitrogen-containing dispersant in an amount that contributes at least 0.08 wt.% nitrogen to the composition.

Having regard to the tests provided in table 1 of the application and in the statement of grounds of appeal, the board considers that the problem formulated above is credibly solved by the composition of claim 1.

4.4 It thus remains to be decided whether the proposed solution is obvious or not in view of the state of the art.

Document (5) discloses the nitrogen-containing dispersants proposed in present claim 1 and their improved ability to control the viscosity increase caused by soot in lubricants (see paragraphs [0001] and [0008]). In particular, document (5) discloses as a preferred dispersant a polyalkenyl succinimide resulting from the reaction of a polyalkenyl substituted succinic anhydride and a polyamine at a coupling ratio of from about 0.65 to about 1.25 (see paragraphs [0034]), where the polyalkylene moiety has a number molecular weight of at least about 1800, a molecular weight distribution of from about 1.5 to about 2.0, and a functionality of about 1.3 to less

than about 1.7 (see paragraphs [0008], [0017], [0019] and claims 1 to 3). Such dispersants and their improved soot dispersion properties in lubricating oils were exemplified in tables 1 and 2 of document (5) (see in particular dispersions D5 and D6 compared to dispersion D2). Thus, the skilled person in the search for lubricating oil compositions alternative to those of document (4) would have found in the disclosure of document (5) a hint towards the use of the specific nitrogen-containing dispersants defined in claim 1 of auxiliary request 1. Thereby, he would have arrived at lubricating oil compositions containing the three components defined in said claim.

This was not disputed by the appellant, whose argument in this respect was rather that the combination of documents (4) and (5) would have led to a lubricant containing less dispersant than the minimum amount required by claim 1 to contribute at least 0.08 wt.% nitrogen to the composition, and that the skilled person starting from document (4) would have been deterred from increasing the amount of dispersant because doing so could have had negative effects (see statement of grounds of appeal, page 5, paragraphs 2 and 3 from the bottom; and document (4): column 1, lines 43 to 63; conclusions in column 6, lines 30 to 40; column 8, lines 57 to 61; and column 10, lines 1 to 7). The appellant also drew attention to the viscosity of oils A and B in the tests filed with the statement of grounds of appeal, which showed that an increase in the amount of dispersant resulted in a lower performance of the lubricant to prevent the viscosity increase caused by soot.

The board cannot assent to these arguments for the following reasons:

Firstly, because the appellant's assertion that claim 1 implicitly requires a dispersant concentration beyond the maximum of 4 wt.% suggested in document (4) is not sufficiently supported. This allegation was based on the contribution of a specific dispersant used in the tests filed with the statement of grounds of appeal which, at a concentration of 5 wt.% contributed only 0.06 wt.% nitrogen to the composition (see oils A and E). However, dispersants encompassed by claim 1 and disclosed in document (5) having a higher nitrogen content than the one illustrated by the appellant achieve the required 0.08 wt.% nitrogen contribution at lower concentrations.

Secondly, because, even assuming that the amount of nitrogen-containing dispersant required by claim 1 were higher than 4 wt.%, the skilled person wishing to further increase soot dispersion had a clear hint in the sentence in column 1, lines 43 to 45 of document (4), to increase the amount of dispersant. The board notes that this step could be accompanied by negative effects such as interference with anti-wear additives, damage to seals, low temperature viscosity, and higher costs (see column 1, lines 47 to 53). The skilled person would, however, not be deterred from increasing dispersant concentration by these negative effects. He would rather consciously accept them in order to obtain the desired result, i.e. better soot dispersion. Moreover, the teaching in document (4) that an increase in the amount of dispersant provides an additional improvement of viscosity control was corroborated by the data in table 1 of the present application, where the entries "Base" and "Comp. 1" showed that the standard test Mack T-11 predicts a considerable increase in soot dispersion when the amount of

dispersant is doubled. These results are much clearer and thus more reliable than those obtained with the tests submitted with the statement of the grounds of appeal (see previous paragraph), which according to the appellant demonstrated that a nitrogen contribution of >0.08 wt.% of the dispersant (oil B) leads to a higher viscosity of the oil as compared to a nitrogen contribution below the claimed range (oil A). However, these differences are marginal (351.66 mPa-sec for oil B vs. 342.76 mPa-sec for oil A as compared to e.g. 235.92 mPa-sec for oil F) and the board therefore has serious doubts that they are statistically relevant. As a consequence, they cannot be taken into consideration for disproving the knowledge at the filing date that an increase of dispersant concentration was linked to an improvement in soot dispersion.

Accordingly, the board concludes that the combination of documents (4) and (5) would have led the skilled person to the composition of claim 1, even if an increase in the amount of dispersant had been necessary. As a result, the subject-matter of claim 1 of auxiliary request 1 lacks an inventive step.

5. *Inventive step of the subject-matter of claim 1 of auxiliary requests 2 and 3 - Article 56 EPC*

Claim 1 of auxiliary requests 2 and 3 impose additional limitations on the dispersant, namely that it is a reaction product of a polyalkenyl substituted succinic anhydride with a polyamine at a coupling ratio of from 0.65 to 1.25 (auxiliary request 2) and that the polyakylenyl moiety has a molecular weight distribution of from 1.5 to 2 (auxiliary request 3). As these additional features correspond to preferred embodiments of the dispersants disclosed in document (5) (see

paragraph [0034] and [0019], and claims 1 and 7), the objection of lack of inventive step raised against claim 1 of auxiliary request 1 applies *mutatis mutandis* to claim 1 of auxiliary requests 2 and 3.

6. *Admission of auxiliary request 4 – Article 13(1), (3) RPBA*

The set of claims of auxiliary request 4 was filed at the oral proceedings before the board, i.e. at a late stage in the appeal proceedings.

The board considered that filing this claim request was a reasonable reaction to the discussion on inventive step of the previous requests because the additional limitation imposed on the functionalised polyolefin copolymer in claim 1 constituted a further difference to the closest prior art. The board also took into account that, under the circumstances of the present case, the filing of this auxiliary request at an earlier stage of the appeal proceedings would not have led to the present appeal case being handled in a different manner such that the late filing of this auxiliary request had no adverse effect on the procedural economy of the appeal proceedings. The board therefore decided to admit auxiliary request 4 into the proceedings.

7. *Remittal – Article 111(1) EPC*

Compared with the amended claim 1 held non-inventive by the examining division, claim 1 of auxiliary request 4 is considerably narrower and contains a substantial limitation on the olefin copolymer that was not explicitly taught in document (4), namely that the olefin copolymer is an ethylene-propylene copolymer

grafted with maleic anhydride and derivatised with an aryl amine. Consequently, the reasons given by the examining division to refuse the application do not directly apply to claim 1 of auxiliary request 4, which requires full examination, especially with regard to Articles 123(2) and 56 EPC.

Following on from the above, claim 1 of auxiliary request 4 raises questions not yet addressed by the examining division which need further consideration and, possibly, analysis of the international patent application WO 96/12746, cited in document (4) as disclosing the details of the functionalised copolymers suitable for use in the invention (see column 4, line 65 to column 5, line 6). With regard to these new aspects, the board would be the first and last instance taking a final decision.

Under these circumstances, the board does not consider it appropriate to decide the case within what is essentially a new factual framework and therefore, exercising its discretion under Article 111(1), second sentence, EPC, remits the case to the examining division for further prosecution. The appellant raised no objections in this respect.

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 for further prosecution on the basis of claims 1 to 10 of

auxiliary request 4 filed at the oral proceedings before the board on 7 July 2017.

The Registrar: The Chairman:

S. Sánchez Chiquero A. Lindner

Decision electronically authenticated