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**D E C I S I O N**  
**of 21 April 1998**

**Case Number:** T 0664/95 - 3.3.1

**Application Number:** 86905065.8

**Publication Number:** 0233250

**IPC:** C10L 1/14

**Language of the proceedings:** EN

**Title of invention:**  
Fuel Products

**Patentee:**  
The Lubrizol Corporation

**Opponent:**  
BP Chemicals (Additives) Ltd

**Headword:**  
Valve seat recession/LUBRIZOL

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Inventive step (yes) - alleged effect made credible -  
additional effect"

**Decisions cited:**  
T 0197/86, T 0002/83

**Catchword:**  
-



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Boards of Appeal

Chambres de recours

Case Number: T 0664/95 - 3.3.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 21 April 1998

**Appellant:**  
(Opponent)

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**Representative:**

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**Respondent:**  
(Proprietor of the patent)

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**Representative:**

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**Decision under appeal:**

Interlocutory decision of the Opposition Division  
of the European Patent Office posted 7 June 1995  
concerning maintenance of European patent  
No. 0 233 250 in amended form.

**Composition of the Board:**

**Chairman:** A. J. Nuss  
**Members:** P. P. Bracke  
R. E. Teschemacher

## Summary of Facts and Submissions

I. This appeal lies from the Opposition Division's interlocutory decision, announced orally on 16 May 1995, with the reasoned decision being issued on 7 June 1995, that, account being taken of the amendments made by the Patent Proprietor (Respondent) during the opposition proceedings, European patent No. 0 233 250 and the invention to which it relates were found to meet the requirements of the EPC.

The decision was based on Claims 1 to 38 and pages 2 to 25 of the description provided during the oral proceedings before the Opposition Division and annexed to the decision under appeal.

The only independent claims read:

"1. A fuel composition for internal combustion engines comprising a major amount of a liquid hydrocarbon fuel and a minor amount sufficient to reduce valve seat recession when the fuel is used in an internal combustion engine of

(A) at least one hydrocarbon-soluble alkali or alkaline earth metal-containing composition, and

(B) at least one hydrocarbon-soluble ashless dispersant in the form of an acylated, nitrogen-containing compound having a substituent of at least 30 aliphatic carbon atoms made by reacting a carboxylic acid acylating agent with at least one amino compound containing at least one

-NH-

group, said acylating agent being linked to said amino compound through an imido, amido, amidine, or acyloxy ammonium linkage; wherein the weight ratio of (A) to (B) is from 4:0.1 to 1:4, and wherein the fuel composition contains less than 1% by volume of lubricating oil."

"36. Use of a fuel composition according to any preceding claim for reducing valve seat recession in an internal combustion engine."

"37. An internal combustion engine operating with a fuel composition according to any one of claims 1 to 35."

and

"38. A process for the preparation of a fuel composition for internal combustion engines which comprises combining a major amount of a liquid hydrocarbon fuel and a minor amount sufficient to reduce valve seat recession when the fuel is used in an internal combustion engine of

(A) a hydrocarbon soluble alkali metal or alkaline earth metal-containing composition,

(B) a hydrocarbon-soluble ashless dispersant in the form of an acylated, nitrogen-containing compound having a substituent of at least 30 aliphatic carbon atoms made by reacting a carboxylic acid acylating agent with at least one amino compound containing at least one

-NH-

group, said acylating agent being linked to said amino compound through an imido, amido, amidine, or acyloxy ammonium linkage; and optionally,

(C) a member selected from:

(1) lead scavengers;

(2) hydrocarbon-soluble components selected from aluminum containing compositions, silicon containing compositions, molybdenum containing compositions, lithium containing compositions, calcium containing compositions, magnesium containing compositions and mixtures thereof; and

(3) hydrocarbon-soluble transition metal containing compositions and mixtures thereof;

wherein the weight ratio of (A) to (B) is from 4:0.1 to 1:4, and wherein the fuel composition contains less than 1% by volume of lubricating oil".

II. The Opposition Division found that the claimed subject-matter was novel and inventive over the cited prior art.

More particularly, the Opposition Division considered that document (1), US-A-3 955 938, which is concerned with sodium containing fuel additives reducing valve seat recession, represented the closest state of the art and that the problem to be solved was the provision of fuel additives for reducing valve seat recession which additionally exhibit improved stability and water tolerance.

Since document (1) was silent about the problem of stability and water tolerance caused by emulsion formation and since it was made credible with the data from demulsification tests according to ASTM D-1094, submitted by the Respondent in his letter of 13 April 1995 and during the oral proceedings (see Annex 4 to the contested decision), that the claimed fuel compositions show improved water tolerance characteristics when a sodium- or a potassium-containing composition (A) is used in combination with an ashless dispersant (B), as compared to when only the sodium salt is used alone, the Opposition Division found that the claimed fuel compositions were not obviously derivable from the cited prior art.

III. During the oral proceedings before the Board of Appeal, which took place on 21 April 1998, the Respondent submitted a set of 38 claims as an "auxiliary request".

IV. The Appellant (Opponent) argued that the claimed compositions differed from the compositions described in document (1) and from those described in document (20), US-A-4 129 508, only by the choice of the ashless dispersant and that the selection of a known ashless dispersant, for which a surprising effect had not been shown, could not form the basis for inventive step.

Document (20) was referred to for the first time in the Appellant's reply to a communication of the Board of Appeal pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal.

Moreover, the Appellant submitted that the newly cited document (20) represented a more relevant prior art than document (1) and, consequently, that document (20) qualified as a suitable starting point for assessing inventive step.

Furthermore, the Appellant submitted that the claimed compositions were obvious over the combined teaching of document (1) and document (8), US-A-3 443 918 (mentioned in the patent in suit and cited during opposition proceedings), from which it was known that the additives used in the claimed compositions as ashless dispersants display highly desirable non-emulsifying properties in fuel compositions.

Additionally, the Appellant contested the validity of the data submitted by the Patentee during the opposition proceedings, since no comparison had been made with fuel compositions containing an hydrocarbon-soluble alkali or alkaline earth metal and an ashless dispersant, and since demulsification properties had not been shown for the broad scope of the claims.

The Appellant also provided data from a demulsification test according to ASTM D-1094 in his letters of 18 and 25 March 1998.

Finally, the Appellant submitted a copy of data from a demulsification test according to ASTM D-1094 filed by the Respondent in connection with a divisional application of the patent in suit.

- V. The Respondent (Proprietor of the patent) submitted that the Appellant had failed to submit any credible experimental evidence to contradict the data he submitted during the opposition proceedings.

Moreover, the Respondent filed additional data to show that, from the additives mentioned in document (1), only ashless dispersants provide improved stability and water tolerance, and that the combination of a metal-containing composition (A) with an ashless dispersant (B) performs better than either (A) or (B) alone.

Since it was not suggested in any of the cited prior art documents that the combined use of (A) and (B) would inhibit emulsion formation, he argued that the claimed fuel compositions were not derivable from the prior art.

- VI. The Appellant requested that the decision under appeal be set aside and that European patent No. 0 233 250 be revoked.

The Respondent requested, as a main request, that the appeal be dismissed and that the patent be maintained in the version as annexed to the decision under appeal. Alternatively, he requested, as an auxiliary request, that the patent be maintained on the basis of the set of claims submitted during the oral proceedings before the Board of Appeal.

### Reasons for the Decision

1. The appeal is admissible.
2. *Main request*
  - 2.1 The Board is satisfied that the contested patent, in its amended form, meets the requirements of Article 123(2) and (3) EPC and that the claimed subject-matter is novel in view of the cited prior art. Since this was not contested, no detailed reasoning needs to be given.



2.2 Inventive step

2.2.1 The Appellant argued that the teaching of document (20) rather than the teaching of document (1) qualified as the most pertinent prior art in assessing inventive step.

Document (1) teaches that sodium containing additives can be incorporated in gasoline and that such additives are effective in inhibiting the occurrence of valve seat recession when the engine operates on lead-free gasoline (column 1, lines 54 to 58). It also teaches that other additives conventionally employed in gasolines, such as ashless dispersants, can be present in the final gasolines (column 4, lines 21 to 29).

Document (20) relates to demulsifier additives for use in fuels coming into contact with water, especially during storage and/or handling reclaiming operations (column 1, lines 11 to 18), which additives contain at least one demulsifier additive comprising (i) one or more reaction products of a hydrocarbon-substituted succinic acid or anhydride with one or more polyalkylene glycols or monoethers thereof, (ii) one or more organic basic metal salts, and (iii) one or more alkoxyated amines (column 2, lines 18 to 26).

Although document (20) does not explicitly mention the problem of valve seat recession, the Appellant was of the opinion that it was inherent to the fuel compositions described therein that they exhibit reduced valve seat recession, since they contain an organic basic metal salt. Moreover, since alkoxyated amines are known ashless dispersants, he was of the opinion that document (20) teaches that compositions containing an organic basic metal salt and an ashless dispersant act as demulsifiers in fuels.

The Appellant therefore was of the opinion that the fuel compositions described in document (1) as well as those described in document (20) exhibit reduced valve seat recession properties and that the claimed compositions differ therefrom only by the selection of a specific class of ashless dispersants. Since document (20) additionally refers to the emulsification problem of fuel compositions coming into contact with water, he concluded that document (20) represented a more relevant prior art than document (1).

2.2.2 However, document (20) teaches only that additive compositions containing the totality of the three components (i) to (iii) have demulsifying properties in fuels, and is completely silent about the properties an organic basic metal salt (ii), as such, or an alkoxyated amine (iii), as such, could give to fuel compositions. Furthermore, the teaching in column 10, lines 28 to 30 and 43 to 46, that the additive compositions containing the totality of the three components (i) to (iii) are in certain preferred fuel compositions combined with an ashless dispersant and that the weight ratio of the demulsifier to the ashless dispersants is generally about 0.1 to 10.0, is at least a strong indication that none of the components (i) to (iii) is taught to have ashless dispersants properties.

Moreover, for determining the disclosure of a document on an objective basis, it is not the possible inherent properties of components described in a document when considered out of context which is relevant, but what information a skilled person would actually derive from the teaching of that document.

Since the problem of valve seat recession is not addressed in document (20) and since the latter does not teach that ashless dispersants have demulsifying properties, the Board finds that a skilled person looking for demulsifying fuels containing a hydrocarbon-soluble alkali or alkaline earth metal-containing composition as an additive for inhibiting valve seat recession would not have taken its teaching into consideration, and, consequently, that document (20) cannot qualify as the most pertinent state of the art.

Since document (1) is the only cited document teaching that metal containing additives are effective in fuel compositions for inhibiting the occurrence of valve seat recession and also the most pertinent state of the art acknowledged in the description, the Board does not see any reason not to start from the technical problem actually described in the patent in suit in relation to the closest state of the art indicated therein.

- 2.2.3 According to the patent in suit fuel compositions containing sodium salts of organic acids have a tendency to emulsify water and, consequently, with some sodium salts an undesirable extraction of the sodium into the water occurs (page 3, lines 24 to 27).

Consequently, in view of the teaching of document (1), the problem underlying the present invention must be seen in the provision of other fuel compositions which inhibit the occurrence of valve seat recession and which **additionally** exhibit water tolerance (see the patent in suit, page 4, lines 24 to 26).

2.2.4 It has never been contested that in examples 1 to 21 of the patent in suit it has been made credible that the combined use of a hydrocarbon-soluble alkali or alkaline earth metal-containing composition and a hydrocarbon-soluble ashless dispersant as defined in Claim 1 decreases the octane requirement increase (ORI) due to the lessening of deposits of carbonaceous-metal nature and, consequently, that it inhibits the occurrence of valve seat recession.

Moreover, it has never been contested that the stability and water tolerance of fuels can suitably be shown using the demulsification tests according to ASTM D-1094.

The Appellant contested, however, that the data from the demulsification test according to ASTM D-1094 provided by the Respondent in the opposition and appeal proceedings was suitable for showing an unexpected behaviour of the claimed fuel compositions, because fuel compositions containing a sodium-containing composition and an ashless dispersant, in general, were known from document (1) and, consequently, in order to establish that a specific class of ashless dispersants is inventive, the experimental evidence needs to show that this specific class is better than the general class.

However, document (1) teaches only that gasoline compositions containing sodium as an additive, which inhibits the occurrence of valve seat recession, may contain other additives conventionally used in gasolines, and that one such additive is the ashless dispersant, and does not specify which properties an ashless dispersant provides to such compositions or in

which weight ratios to the sodium the ashless dispersants should be contained. Therefore, the actual disclosure of this document does not extend to the teaching that ashless dispersants in general demulsify fuels containing sodium as an additive inhibiting the occurrence of valve seat recession.

The Appellant also referred to example 2 of document (1), which describes engine tests in which a low-lead fuel is used in a car which is lubricated with a crankcase motor oil containing an ashless dispersant. Since some lubricant penetrates in the fuel he concluded that document (1) disclosed fuel compositions containing a sodium derivative and an ashless dispersant.

However, since such a possibly occasional short-term existence of a fuel containing the components (A) and (B) would neither teach a skilled person which properties the ashless dispersant would provide to the fuel nor in which weight ratio to the sodium the ashless dispersant should be present, a skilled person could not get any hint therefrom that an ashless dispersant would have demulsifying properties.

The Board therefore considers that the information contained in document (1) is restricted to the teaching that sodium-containing gasoline compositions may contain any of the additives cited in column 4, lines 22 to 29.

Since according to the jurisprudence of the Boards of Appeal of the EPO, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention (T 197/86 OJ

EPO, 1989, 371, point 6.1.3), in order to show that, in comparison with compositions containing only a metal derivative, the claimed fuel compositions additionally have improved stability and water tolerance, it is sufficient to make a comparison with fuel compositions containing a metal derivative only.

2.2.5 Consequently, since the data from the demulsification test according to ASTM D-1094 provided by the Respondent in the opposition and appeal proceedings sufficiently show that

- fuels containing 0.24 g/l or 0.96 g/l respectively of a sodium component having a metal content of 2.50% by weight and 0.06 g/l (84 ppm) of an ashless dispersant according to Claim 1 have better demulsifying properties than fuels containing only 0.24 g/l or 0.96 g/l respectively of the sodium component (Tables I and II provided by the Respondent in his letter of 13 April 1995),
- fuels containing 0.24 g/l of a potassium salt of a branched chain alkylated sulfonic acid having a metal content of 3.8% by weight and 0.06 g/l of an ashless dispersant according to Claim 1 have better demulsifying properties than fuels containing 0.24 g/l of the potassium component (Annex 4 to the contested decision),
- fuels containing 0.24 g/l of a sodium component having a metal content of 2.50% by weight respectively of a potassium component having a metal content of 4.0 % by weight and 0.06 g/l (84 ppm) of an additive other than an ashless dispersant have no better demulsifying properties than fuels containing 0.24 g/l of the sodium or potassium component (Tables III and IV provided by the Respondent in his letter of 19 March 1998),

and

- the demulsifying properties of fuels containing only 0.06 g/l (84 ppm) of an ashless dispersant according to Claim 1 are inferior to those of fuels free of components (A) and (B) (Table V submitted with letter of 27 March 1998),

the Board finds that it has been made credible that through the combined use of a component (A) with a component (B), satisfactory demulsifying properties are obtained which could not have been obtained with the use of either component (A) or component (B) alone.

- 2.2.6 This finding is not contradicted by the data from the demulsification tests according to ASTM D-1094 provided by the Appellant in his letters of 18 and 25 March 1998, which was submitted in an attempt to show that an anti-valve seat recession additive does not in fact cause severe problems with water tolerance, the addition of an ashless dispersant according to the invention has no apparent beneficial effect at all, and the ashless dispersants according to the invention are no better in terms of water tolerance than other ashless dispersants not claimed.

In these demulsification tests the **maximum concentration** of the ashless dispersants was **43.5 ppm**, contrary to the teaching in the patent in suit (page 22, lines 13 to 15) that the claimed fuels generally contain as a sufficient amount from 50 to 500 ppm, preferably from 80 to 400 ppm, of the ashless dispersant. Therefore, this data from the Respondent's demulsification tests is not suitable to show that the addition of an ashless dispersant according to the patent in suit has no beneficial effect.

Moreover, through a comparison of the time taken for the mixture to separate back into two separate layers, the data shows that the break time of a fuel containing 113 ppm of a potassium component inhibiting the occurrence of valve seat recession is double the break time of a fuel not containing such an agent and, consequently, this data is also not suitable for showing that the addition of an anti-valve seat recession additive would not cause severe water tolerance problems.

Additionally, since the prior art does not actually disclose fuel compositions containing a valve seat recession reducing agent and an ashless dispersant agent as demulsifier, it is not relevant whether other ashless dispersants than the claimed ones provide analogous demulsifying properties, as the Appellant attempted to show with this data and with the data provided by the Respondent in connection with a divisional application of the present patent in suit.

Finally, since the data provided by the Appellant is not suitable for showing that the addition of an ashless dispersant according to the patent in suit has no beneficial effect, this data is also unable to support his submission that demulsification properties had not been shown for the broad scope of the claims, for which submission the Appellant had the onus of proof.

2.2.7 The Board therefore concludes that the Respondent has shown that the claimed fuel compositions combine water tolerance with a significant reduction in valve seat recession.



2.2.8 The Appellant also submitted that the data provided by the Respondent is not suitable for showing that water tolerance is obtained in the complete broadly claimed scope.

It is a generally accepted principle that the onus of proof is on the Party making such submission. Since in the present case the data provided by the Appellant was not suitable to show which combinations of component (A) and component (B) were suitable and which were not suitable to provide fuels having the desired properties, the Board concludes that the Appellant's submission was not sufficiently supported.

2.2.9 Therefore, in assessing inventive step, the question arises whether, in view of document (1), it was obvious for a skilled person to select an ashless dispersant as defined in Claim 1 when trying to solve the technical problem set out above.

2.2.10 It has never been contested that document (1) teaches that gasoline compositions containing a sodium containing additive effective in inhibiting the occurrence of valve seat recession may contain other additives conventionally employed in gasolines, that one of those additives may be an ashless dispersant and that the ashless dispersants according to Claim 1 were well known (see the patent in suit, page 9, lines 5 to 7). The Appellant concluded from this that it would have been obvious for a skilled person that the ashless dispersants according to Claim 1 were one group of components which could be used. However, according to the established case law of the Boards of Appeal, in order to demonstrate obviousness it is not sufficient that a skilled person could have interpreted document (1) in such a way that the fuel compositions described therein may contain an ashless dispersant, but it must be made credible that a skilled person

would have chosen the ashless dispersants according to Claim 1 (see T 2/83, OJ EPO, 1984, 265, Reason 7). Because in document (1) there is not the slightest hint that ashless dispersants, let alone those according to Claim 1, have demulsifying properties, the Board concludes that from the teaching of document (1) alone it would not have been obvious to select such ashless dispersants.

2.2.11 The question still remains whether it was suggested in any of the other cited prior art documents that the ashless dispersants according to Claim 1 have demulsifying properties.

Since document (8) is concerned with the use of alkenyl succinimides in fuel compositions as deposit-suppressing agents and as detergents (column 1, lines 26 to 30, and column 2, lines 53 and 54), and since in column 2, lines 54 to 61, it is taught that the alkenyl succinimides "... also display highly desirable non-emulsifying properties in fuel compositions. A disadvantage, common to many surface-active additives, is the property of forming undesirable emulsions of water with the hydrocarbon stocks in which they are used. The alkenyl succinimides of this invention show very low emulsifying propensities in hydrocarbon fuels", the Appellant concluded that it was suggested therein that the ashless dispersants according to Claim 1 have demulsifying properties in fuels.

However, since from document (8) it may only be deduced that the alkenyl succinimides have non-emulsifying or very low emulsifying properties and not that such detergents would have demulsifying properties, the Board finds that it was not suggested therein that the ashless dispersants according to Claim 1 would provide water tolerance to fuel compositions, let alone that

the combination of a hydrocarbon-soluble alkali or alkaline earth metal-containing composition (A) with an ashless dispersant (B), as defined in Claim 1, would have water tolerance over either the salt (A) or the dispersant (B) alone.

Additionally, since document (20) does not mention ashless dispersants according to Claim 1, a skilled person could not have got a hint about the demulsifying properties of the ashless dispersants (B) from this document either.

2.2.12 The Board therefore concludes that, starting from the fuel compositions described in document (1) as the most relevant prior art, a skilled person would have had no incentive to take the teaching of document (8) and/or document (20) into consideration. Consequently, the claimed compositions were not obviously derivable from the combined teaching of documents (1), (8) and (20).

2.2.13 Since the Appellant consistently used a different starting point for challenging inventive step, the Board finds it appropriate to point out that the outcome of the assessment of inventive step would not have been any different if the teaching of document (20) had been considered as the most relevant starting point, because,

(i) in view of document (20), the problem to be solved would have been the provision of fuel compositions having improved demulsifying properties and reduced valve seat recession;

(ii) although a skilled person could have deduced from document (1) that sodium containing additives in gasolines are effective in inhibiting the occurrence of valve seat recession, in none of the cited documents was it suggested that the ashless dispersants according to Claim 1 would demulsify fuel compositions containing such sodium containing additives; and

(iii) therefore, it was not obviously derivable from the teaching of document (20), taken alone or in combination with the teaching of document (1), that the claimed fuel compositions combine a significant reduction in valve seat recession with improved stability and water tolerance.

2.2.14 The Appellant also wanted Claim 1 to contain the restriction that the claimed fuels contain the amounts of ashless dispersants as mentioned on page 22, lines 13 to 15, of the patent in suit.

The Board cannot accept this objection either, since it is not excluded from that passage of the patent in suit, stating that **generally** fuels will be prepared to contain from about 50 to about 500 ppm, preferably from about 80 to about 400 ppm, of ashless dispersant, that some specific combinations of component (A) and component (B) outside those weight ranges would not have the desired properties.

Moreover, in the Board's judgement any fuel containing a combination of component (A) with component (B) which does not lead to the desired properties is excluded from the wording of Claim 1 by the requirement that the fuel must contain "a minor amount **sufficient to reduce valve seat recession when the fuel is used in an internal combustion engine**" (emphasis added).

2.2.15 Claims 2 to 35, which represent preferred embodiments of Claim 1, and Claims 36, 37 and 38 derive their patentability from that of Claim 1.

2.2.16 The Board therefore concludes that none of the claimed subject-matter is obviously derivable from the cited prior art documents.

3. In view of the above and since the description is duly adapted to the set of claims, the grounds for revoking the patent in suit do not prejudice the maintenance of the patent according to the main request.

4. In the light of the above findings, there is no need to consider the auxiliary request.

**Order**

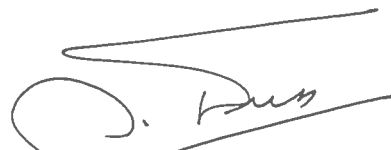
**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

  
E. Görgmeier

The Chairman:

  
A. Nuss



