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**Datasheet for the decision  
of 15 July 2014**

**Case Number:** T 0649/12 - 3.3.01

**Application Number:** 07115075.9

**Publication Number:** 1900797

**IPC:** C10M127/02, C10M133/16,  
C10M141/02, C10M141/06,  
C10M159/04, C10M169/04

**Language of the proceedings:** EN

**Title of invention:**  
Lubricant composition

**Patent Proprietor:**  
Afton Chemical Corporation

**Opponents:**  
Castrol Limited  
Lubrizol Limited  
Chevron U.S.A. Inc.

**Headword:**  
Tetracycloparaffin comprising base oil/AFTON

**Relevant legal provisions:**  
EPC R. 115(2)  
RPBA Art. 15(3)  
EPC Art. 84

**Keyword:**  
All request: clarity (no) -  
parameter cannot be clearly and reliable determined by indicated method

**Decisions cited:**

T 0301/87, G 0009/91, G 0002/88, T 0337/95, T 0560/09

**Catchword:**



**Beschwerdekammern  
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Case Number: T 0649/12 - 3.3.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.01**  
**of 15 July 2014**

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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 11 January 2012  
revoking European patent No. 1900797 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman** A. Lindner  
**Members:** G. Seufert  
D. Rogers

## **Summary of Facts and Submissions**

- I. The patent proprietor lodged an appeal against the decision of the opposition division revoking European patent No. 1 900 797.
- II. The present decision refers to the following documents:
- (17) Fuels and Lubricants Handbook: Technology, Properties, Performance and Testing, George E. Totten, ASTM Manual Series MNL37WCD, ASTM International, West Conshohocken (US), 2003, pages 169 to 197
  - (23) I. Dzidic *et al.*, Analytical Chemistry, Vol. 64, No. 19, 1992, pages 2227 to 2232
  - (27) P. A. Wadsworth, D. C. Villalanti, Hydrocarbon Processing 1992, 4 pages
  - (30) Declaration of J. Rosenbaum of 25 March 2011, including Exhibits JR 1-13, submitted by opponent 3 with letter of 28 March 2011
  - (36) Affidavit of D. Villalanti of 14 October 2011, submitted by patent proprietor with letter of 18 October 2011
  - (37) Affidavit of M. Devlin of 18 October 2011, including Annexes 1 to 10, submitted by patent proprietor with letter of 18 October 2011
  - (39) Affidavit of D. Villalanti of 10 May 2012 submitted by the appellant with the statement of grounds of appeal
- III. Notices of opposition were filed by respondents 1 to 3 requesting revocation of the patent in suit in its entirety of the grounds of lack of novelty and lack of inventive step.

- IV. The decision of the opposition division was based on the main request and auxiliary requests 1 and 2, all filed during the oral proceedings before the division.

The opposition division held that the amended main request complied with Article 123(2) and (3) EPC, but lacked clarity, because the tetracyclopaffin content could not clearly and reliably be determined according to the method to which claim 1 referred (i.e. the method disclosed in document (23)). For the same reason, auxiliary requests 1 and 2 were considered to lack clarity.

- V. With the statement of grounds of appeal the appellant resubmitted the main request and auxiliary requests 1 and 2.

Claim 1 of the main request reads as follows:

"1. A lubricant composition comprising a dispersant and a Group II base oil comprising more than 3% by weight of tetracyclopaffins, relative to the total weight of the base oil, analyzed according to the procedure in Analytical Chemistry, 64:2227 (1992), wherein the dispersant is at least one of succinimide, borated succinimide, Mannich dispersant, functionalized olefin copolymer, and poly(meth)acrylate copolymer."

Claim 1 of auxiliary request 1 reads as follows:

"1. A lubricant composition comprising a dispersant and a base oil comprising more than 3% by weight of tetracyclopaffins, relative to the total weight of the base oil, analyzed according to the procedure in Analytical Chemistry, 64:2227 (1992), wherein the dispersant is at least one of succinimide, borated

succinimide, Mannich dispersant, functionalized olefin copolymer, and poly(meth)acrylate copolymer, and wherein the base oil of the composition is a group II base oil."

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that the feature "wherein the base oil is present in the lubricating composition in an amount greater than or equal to 80% by weight relative to the total weight of the composition" has been added.

VI. The arguments of the appellant with respect to the decisive issues can be summarised as follows:

Although the samples examined in document (23) did not contain tetracycloparaffins, said document gave a clear indication in table II as to how to detect those compounds. There could therefore be no doubt that the method referred to in the claims could detect and determine the amount of tetracycloparaffins in the same way as it could detect and determine other types of hydrocarbons. Based on the gas chromatographic separation inherently involved in the method and the substantially different peak patterns, it was also possible to distinguish between hydrocarbons belonging to the same z-type, like tetracycloparaffins and alkylbenzenes. Moreover, it was basic knowledge of the person skilled in the art at the priority date of the patent in suit that group II base oils contained in general a negligible amount of aromatic hydrocarbons. The problem of differentiation would therefore not arise. In exotic cases, where the amount of aromatics was not negligible, it was also possible for the skilled person to routinely apply a simple correction to the value obtained by the claimed method, based on

the determination of the total aromatics content. The latter could be obtained by the application of generally known analytical methods.

No adjustments of the parameter set, in particular no adjustment of the sensitivity values, had to be made for the examination of group II base oils as compared to the middle distillates described in document (23). The skilled person would apply the method as disclosed therein.

VII. The arguments of the respondents with respect to the decisive issues can be summarised as follows:

Document (23) was directed to the analysis of particular hydrocarbon distillates, not base oils. It did not teach a method for the determination of tetracycloparaffins. In particular, it did not teach how to distinguish between aromatics and tetracycloparaffins of the same z-type, which was a problem not encountered in document (23). However, in group II base oils both compound classes were present. With respect to the method for the determination of tetracycloparaffins in case the amount of aromatics was not negligible as described in the second expert opinion of Mr Villalanti, it was pointed out that this method relied on the determination of the total aromatics content using known available methods. These methods, however, would not lead to the same results and document (23) did not provide any indication which one to use. The gas chromatographic separation in the claimed method yielded different fractions, but those were still complex mixtures. No complete resolution was possible, otherwise there was no point for the method of document (23). There was also nothing in document (23) from which it could be deduced that



resolution of aromatics and TCPs was possible. The alleged difference in peak patterns was also not apparent from document (23). The expert opinions of Mr Villalanti were not helpful in that respect either.

Since document (23) was concerned with the analysis of petroleum middle distillates, which did not contain tetracycloparaffins, the skilled person was also faced with the question how to implement this method for base oils, in particular what sensitivity values should be used. These values varied for different species and those of the z=-6 type in document (23) were linked to aromatics, not tetracycloparaffins. Mr Villalanti's assertion that the parameter set and sensitivity values were the same was information as to what was practice in Mr Villalanti's company. Decisive was, however, what document (23) taught the skilled person.

- VIII. The representative of respondent 1 informed the board that he would not be attending the oral proceedings.
- IX. The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request, or alternatively, on the basis of one of the auxiliary requests 1 or 2, all requests filed under cover of a letter dated 16 May 2012.
- X. The respondents requested that the appeal be dismissed. In addition, respondents 2 and 3 requested that the case be remitted to the department of first instance for further prosecution, if one of the appellant's claim requests was found to meet the requirements of Articles 123(2) and (3), 83 and 84 EPC.
- XI. At the end of the oral proceedings the decision of the board was announced.

## **Reasons for the Decision**

1. The appeal is admissible.
2. Non-appearance of a party at oral proceedings before the board
  - 2.1 As announced (see point VIII above), respondent 1 was not present at the oral proceedings before the board to which it had been duly summoned.
  - 2.2 According to Rule 115(2) EPC, oral proceedings may continue in the absence of a duly summoned party. According to Article 15(3) of the Rules of Procedure of the Boards of Appeal (RPBA), the board is not obliged to delay any step in the proceedings, including its decision, by reasons only of the absence at the oral proceedings of any party duly summoned, which may then be treated as relying only on its written case. In deciding not to attend oral proceedings, respondent 1 chose not to avail itself of the opportunity to present its observations and comments orally.
  - 2.3 The contentious issues were apparent from the decision under appeal, the statement of grounds of appeal and the replies thereto. Respondent 1 must have expected that the board would decide on these issues at the oral proceedings. Hence, the board concludes that respondent 1 had an opportunity to present its observations and comments on the grounds and evidence on which the board's decision is based. The board was, therefore, in a position to take a final decision at the oral proceedings despite the absence of the duly summoned respondent 1.

*All requests*

3. Clarity (Article 84 EPC)

3.1 In the course of the opposition proceedings, claim 1 as granted has been amended by the introduction of features taken from the description. In such a case, according to established jurisprudence, the opposition division and the board have the power under Article 101(3) EPC to examine whether the amendments introduce any contravention of requirements of the EPC, including Article 84 EPC (T 301/87, OJ EPO 1990, 335, point 3.8 of the Reasons).

An objection under Article 84 EPC as a result of the amendments made to claim 1 was also raised by the opponents.

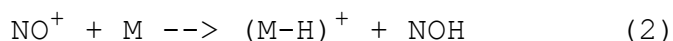
3.2 Article 84 EPC in combination with Rule 43(1) EPC requires that the claims must be clear and define the matter for which protection is sought in terms of the technical features of the invention. These requirements serve the purpose of ensuring that the public is not left in any doubt as to which subject-matter is covered by a claim and which not. Accordingly, a claim cannot be considered clear in the sense of Article 84 EPC if it does not unambiguously allow this distinction to be made (see decisions G 2/88, OJ EPO 1990, 93, point 2.5 of the reasons and T 337/95, OJ EPO 1996, 628, points 2.1 to 2.5 of the reasons). A claim comprising an unclear technical feature, therefore, entails doubts as to the subject-matter covered by that claim. This applies all the more if the unclear feature is essential with respect to the invention in the sense that it is intended to delimit the subject-matter claimed from the prior art, thereby giving rise to

uncertainty as to whether or not the subject-matter claimed is anticipated (see decision T 560/09, not published, point 2 of the reasons).

- 3.3 Claim 1 of the main request is directed to a lubricant composition characterised by the presence of a particular amount of tetracycloparaffins (TCPs) "analysed according to the procedure in Analytical Chemistry, 64:2227 (1992)" (i.e. document (23)).

This reference was introduced by the appellant in an attempt to overcome the novelty and inventive step objections raised by the respondents in their notices of opposition. It was argued that the TCPs detected and determined by the method according to document (23) were different from those detected and determined by known methods. It is therefore essential for the determination of the subject-matter covered by claim 1 and its delimitation from the prior art that the amount of tetracycloparaffins can be clearly and reliably determined by the indicated method.

- 3.4 Document (23) describes a method for hydrocarbon type analysis of petroleum distillates with a boiling range of 350 to 850°F, so-called middle distillates, based on the use of Townsend discharge nitric oxide chemical ionisation gas chromatography/mass spectrometry (TDNOCI GC/MS). It classifies hydrocarbon types by their carbon number  $n$  and hydrogen deficiency or  $z$  number, defined by the general formula  $C_nH_{2n+z}$ , and gives distribution of types within specified boiling ranges (page 2227, abstract). The  $NO^+$  reactant ions produced under TDNOCI conditions ionize aromatic hydrocarbons by the charge exchange reaction (1) and saturated hydrocarbons by the hydride abstraction reaction (2)



Ion intensities are summed over specific GC retention times. The most abundant ions summed for each hydrocarbon type are listed in table II. This table mentions aromatics of the z-type of "-6" with the most abundant ions summed of  $\text{C}_n\text{H}_{2n-6}$  (i.e  $\text{M}^+$  ion according to equation (1) on page 2227).

In the footnote of table II it is indicated that tetranaphthenes - uncontestedly synonymous with tetracycloparaffins - also exhibit the  $\text{M}^+$  ion as the most abundant ion, as do alkylbenzenes of the same formula  $\text{C}_n\text{H}_{2n-6}$ , and that the same behaviour is expected for penta-, hexa- and higher polynaphthenes. In the same footnote, it is further indicated that these polynaphthenes are not present in the middle distillate, but are present in the heavier petroleum samples boiling above 850°F.

In the board's judgement, this footnote alerts the skilled person to the fact that the simultaneous presence of alkylbenzenes and TCPs in a hydrocarbon sample to be examined by the TDNOCI GC/MS method complicates the situations with respect to their differentiation and, as a consequence, with respect to the determination of their respective amounts. This immediately raises the question as to how this problem, should it arise, can be resolved. To this question, document (23) provides no answer. It is entirely silent as to how the skilled person should proceed in such circumstances. In fact, since the hydrocarbon samples examined in document (23) did not contain TCPs or

higher polynaphthenes, there was no need to consider or even provide a solution to this problem.

3.5 In the present case, the hydrocarbon sample is not a middle distillate, but a group II base oil. According to the appellant, it was known that group II base oils were low in aromatics. The problem of differentiating between alkylbenzenes and TCPs would therefore not arise. However, contrary to the appellant's assertion and irrespective of the results of the few examples of base oils examined by the appellant (see document (37), point II.4), the amount of aromatics in group II base oils is not in general insignificant as can be seen from document (17), tables (8) and (10). In these circumstances, the information provided by document (23) alone is not sufficient for a clear and reliable determination of the amount of TCPs.

3.6 The board also notes that in order to determine the hydrocarbons in a sample different to the middle distillates of document (23), the skilled person would be faced with the question whether or not he has to adapt the experimental conditions and if so how, in particular, whether or not he should use the same sensitivity value (ionisation efficiencies) as provided for the aromatics of the z-type of "-6" in table I or whether he needs to change it. To none of those questions document (23) provides an answer. Neither has the appellant provided conclusive evidence that the answer to these questions is part of the common general knowledge of the average skilled person.

3.7 According to the appellant, document (23) allowed a clear distinction between alkylbenzenes and TCPs for mainly two reasons. Firstly, the method described in said document inherently involved a chemical separation

of the mixture by gas chromatography prior to mass spectrometric analysis of the individual fractions thus obtained. In support, reference was made to point 4 of documents (36) and (39), figure 4 in document (23), showing the separation of compounds of the same z-type, and Exhibit JR11 of document (30), page 3, first paragraph. Secondly, the ion pattern obtained from aromatic hydrocarbons differed substantially from that of saturated hydrocarbons (paraffins). Aromatics yielded only the molecular ions  $M^+$  according to equation (1) of document (23). Saturated paraffins and mono-, di- or trinaphthene yielded the  $(M-H)^+$  ions according to equation 2 (page 2227, right column, penultimate paragraph). TCPs yielded both  $M^+$  and  $(M-H)^+$  ions. Document (27) was considered to confirm the teaching of document (23) and, in addition, indicated that for aromatics there was minimal formation of  $(MNO)^+$  ions.

- 3.8 The board does not agree with the appellant. None of the documents relied on by the appellant provides conclusive evidence that alkylbenzenes and TCPs are resolved. Neither document (36) nor document (39) mention such a resolution. Document (36) refers in point 4 to the distinction of aromatics and cycloparaffins by the source reaction with  $NO^+$  and concludes that in hydrocarbons with low amounts of aromatics the species at "Z-6" would be TCPs. Document (39) refers in point 4 to standard analytical methods for the determination of aromatics and saturates content and their use in combination with the method of document (23), if the amount of z=-6 aromatics in a sample is too significant to be neglected.

According to document (23) (see figure 4) resolution of alkylbenzenes (z-type of "-6") and heteroaromatic alkylbenzothiophenes (z-type of "-6") is possible. However, this resolution cannot be taken as evidence that alkylbenzenes and TCPs are also resolved. Nor is it relevant in this context that alkylphenols, another heteroaromatic hydrocarbon of the z-type of "-6", can be distinguished from monoaromatics (document (36), point 5). Exhibit JR11 of document (30) indicates that the combination of gas chromatography and mass spectrometry **often** allows to distinguish between different types of hydrocarbons with the same z-number. However, such a rather vague and general statement cannot prove that TCPs and alkylbenzenes are indeed resolved.

Concerning the allegedly different peak patterns, the board does not agree with the appellant's conclusion drawn from document (23). On page 2227, penultimate paragraph, document (23) refers to the difference between aromatics showing the  $M^+$  ion and paraffins and mono-, di- and tricyclic naphthenes yielding the  $(M-H)^+$  ions (and low-intensity fragment ions of the same mass as the electron impact fragment). Tetranaphthenes (TCPs) or higher polynaphthenes are not mentioned in this context. From the footnote in table II it is apparent that those naphthenes behave differently insofar as they show the  $M^+$  ion as the most abundant ion. There is no information in document (23) that these polynaphthenes, in addition, yield the  $(M-H)^+$  ions. In other words, the board cannot follow the appellant's interpretation that the word "also" in this context has to be understood as "in addition to the  $(M-H)^+$  ion", but rather that TCPs show the  $M^+$  "in the same way as alkylbenzenes". No other conclusion can be drawn with regard to document (27), which describes



that the reaction according to equation (2), predominant for aromatics, also occurs for the condensed polycyclic saturates such as cholestane (i.e. tetranaphthene). Thus, the only conclusion the skilled person can draw from document (23) is that aromatics can be distinguished from paraffins and mono-, di- and tricyclic naphthenes by their peak pattern. With regard to the footnote in table II, he can also conclude that in a hydrocarbon sample with practically no TCPs, as in the examined middle distillates, the detected z-type of "-6" must be alkylbenzenes and, vice versa, in a hydrocarbon sample with practically no amounts of aromatics the detected z-type of "-6" relates to TCPs. As set out in point 3.4 above, information as to how the skilled person can differentiate between simultaneously present alkylbenzenes and TCPs is not provided in document (23).

- 3.9 Concerning the distinction between aromatics and TCPs, the appellant also relied on the second affidavit of Mr Villalanti (document (39)) indicating in the last sentence of point 4, that aromatics of the z-type "-6" and saturates of the same z-type can be distinguished by the skilled person "**within the MS method** (emphasis added by the board) or by applying a correction to a determined total z=-6 amount".
- 3.10 However, this statement has to be read in its context. Mr Villalanti explains in point 3 of document (39) that a person skilled in the art will generally identify "z=-6" with TCPs in a group II base oil, allegedly known to be low in aromatics. In a middle distillate, which is known to be free of TCPs, the skilled person will identify "z=-6" with alkylbenzenes. Mr Villalanti continues in point 4 that it was standard practice of the person skilled in the art to determine aromatics

and saturates content by alternative methods e.g. ASTM D2549, FTIR or NMR. Thus, in all cases where the contribution of "z=-6" aromatics is "too significant to be neglected, a mathematical correction is, and has been, applied to subtract the aromatics from the total "z=-6" based on the aromatics content determined according to conventional analytical methods". Hence, the board understands Mr Villalanti's statement referred to by the appellant to the effect that aromatics and TCPs can be distinguished by the TDNOCI GC/MS method in cases where either the amount of aromatics or the amount of TCPs can be neglected. If this is not the case, the method cannot distinguish between those compounds and further measurements (corrections) are required.

As explained above, the aromatics content in group II base oils is not negligible. Furthermore, even if the board accepts Mr Villalanti's assertion that analytical methods for the determination of aromatics and saturates are in principal known to the skilled person, there is no information in document (23) as to which of these methods should actually be used. Neither has the appellant provided any evidence that all those conventional analytical methods, based on different physical properties, give essentially the same results with respect to the level of aromatics.

- 3.11 With respect to the sensitivity value, the appellant also relied on document (39) and Mr Villalanti's statement therein that the sensitivity values used are the same whether the sample to be analysed has a boiling point up to 850°F or up to 1000°F. It was also stated that aromatic and saturated "z=-6" species were measured and processed using the same sensitivity factors and parameters.

- 3.12 However, the board concurs with the respondents that this is information as to what is practice in Mr Villalanti's company, not what is available to the skilled person from document (23). In this context, the board would also like to point out that the opinion of a highly skilled expert does not necessarily reflect the view of a skilled reader. Such experts often have their own experience, which is not necessarily common general knowledge. No convincing explanation has been provided as to why the skilled person based on his general knowledge would have applied the same sensitivity value provided in document (23) for the z=-6 aromatics for the calculation of TCPs, in particular in view of the fact that the sensitivity values vary for different species, e.g. paraffins (z-type "+2"), mononaphthenes (z-type "0"), dinaphthenes (z-type "-2"), trinaphthenes (z-type "-4"), aromatics (z-type "-6"), etc. (page 2228, table I, last row).
- 3.13 It follows from the above that the amount of TCPs can not clearly and reliably be determined by the method referred to in claim 1 of the main request. This leaves the public in doubt as to which subject-matter is covered by this claim, with the consequence that the requirement of Article 84 EPC is not met. The main request must therefore be refused.
- 3.14 The feature "as analyzed according to the procedure in Analytical Chemistry, 64:2227" is also present in claim 1 of auxiliary requests 1 and 2. Therefore, the same observations and conclusion as set out in point 3.1 to 3.13 apply, with the consequence that these requests must also be refused for failing to comply with Article 84 EPC.

**Order**

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

1. The appeal is dismissed.

The Registrar:

The Chairman:



M. Schalow

A. Lindner

Decision electronically authenticated