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**D E C I S I O N**  
**of 8 December 2005**

**Case Number:** T 0185/02 - 3.3.6

**Application Number:** 95932651.3

**Publication Number:** 0778875

**IPC:** C10L 1/18

**Language of the proceedings:** EN

**Title of invention:**

Oil additives, compositions and polymers for use therein

**Patentee:**

ExxonMobil Chemical Patents Inc.

**Opponent:**

Clariant GmbH

**Headword:**

Cold flow additives/EXXONMOBIL

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Main request - inventive step (no): obvious to try"

"First and second auxiliary requests - inventive step (no):  
obvious alternative"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0185/02 - 3.3.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.6  
of 8 December 2005

**Appellant:** Clariant GmbH  
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**Representative:** -

**Respondent:** ExxonMobil, Chemical Patents Inc.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 14 December 2001  
rejecting the opposition filed against European  
patent No. 0778875 pursuant to Article 102(2)  
EPC.

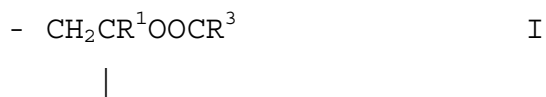
**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** G. Dischinger-Höppler  
J. H. Van Moer

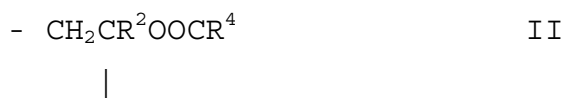
## Summary of Facts and Submissions

I. This appeal is from the decision of the Opposition Division to reject the opposition and to maintain the European patent No. 0 778 875 as granted with independent Claims 1 reading:

"1. An oil composition comprising an oil and an oil-soluble ethylene terpolymer containing, in addition to units derived from ethylene, units of the formula:



and units of the formula



wherein R<sup>1</sup> and R<sup>2</sup> each independently represent H or methyl; R<sup>3</sup> represents an alkyl group having up to 4 carbon atoms; and R<sup>4</sup> represents a branched chain alkyl group having from 8 to 15 carbon atoms, other than a tertiary alkyl group, or a branched chain alkyl group having at most 7 carbon atoms, R<sup>3</sup> and R<sup>4</sup> being different; the degree of branching of the terpolymer, as measured by proton NMR spectroscopy, being less than 6 CH<sub>3</sub> groups per 100 CH<sub>2</sub> units."

II. A notice of opposition had been filed against the granted patent, wherein the Opponent sought revocation of the patent on the grounds of Article 100(a) EPC for lack of novelty and lack of inventive step

(Articles 52(1), 54(2) and 56 EPC). The opposition was based inter alia on the following documents

D1 WO-A-94/00536

D3 DE-A-1 914 756 and

D6 EP-A-0 493 769.

During the opposition proceedings, the Patent Proprietor filed experimental evidence under cover of the letter dated 2 November 2001.

- III. In its decision, the Opposition Division held that the subject-matter of Claim 1 was not only novel in view of the cited prior art but also inventive, in particular when considering the above experimental evidence of the Patent Proprietor.
- IV. With a letter dated 14 February 2002, the Opponent (hereinafter Appellant) filed an appeal against this decision. During the appeal proceedings, the Appellant submitted experimental tests and further documents, and the Patent Proprietor (hereinafter Respondent) filed a set of amended claims in an auxiliary request.
- V. Upon a request made by the Respondent, oral proceedings before the Board of Appeal were held on 9 July 2004, in the course of which the Respondent filed amended claims in a second auxiliary request.

VI. The Appellant orally and in writing submitted in essence the following arguments:

- The claimed subject-matter was not novel, *inter alia*, in view of D1.
  
- The claimed subject-matter was not inventive in view of D1 as the closest prior art, since it was obvious for those skilled in the art to use in Example H instead of the linear octyl group the branched 2-ethylhexyl group which was mentioned in the description as a possible modification, the more so as it was known from D6 that branched chain ester groups in the terpolymer were efficient for the purpose of improving flowability of the oil, especially at low temperatures, and since it was known from D3 that ethylene-vinyl acetate polymers having not more than 6 short chain branches per 100 methylene groups were particularly useful for that purpose.
  
- Further, it was apparent from the examples in the patent in suit and from the Appellant's experimental data that no technical improvement was achieved by the claimed subject-matter as compared with the prior art disclosed in D6 and D1 (Example H). In contrast, the comparative data filed by the Respondent during the opposition proceedings did not relate to the claimed subject-matter since no degree of short chain branching was defined. This latter argument was produced for the first time during the oral proceedings before the Board.

VII. The Respondent submitted the following arguments:

- The experimental data and references filed late by the Appellant during the appeal proceedings were not relevant and to be disregarded.
- Neither D1 nor any other prior art document contained a clear and unambiguous disclosure of all the features of the claimed terpolymer in combination.
- It was apparent from the Respondent's experimental data that, compared with the prior art disclosed in D1, the claimed subject-matter performed better or at least comparably well in the cold filter plugging point (CFPP) test over a wide variety of different fuel oils.
- There was, however, no incentive in the prior art to replace for that purpose the vinyl n-octanoat used in Example H of D1 by a vinyl ester having a branched chain alkyl group since the preferred teaching of D1 concerned those embodiments where the vinyl ester contained straight chain alkyl groups.
- Further, the subject-matter claimed in the auxiliary requests, which was restricted to embodiments with  $R^4$  being a secondary alkyl group, was a non-obvious alternative in view of the disclosure of D1.
- Finally the Respondent requested to be given the opportunity to provide evidence showing that the

terpolymers used in its tests filed during the opposition proceedings had the required short chain branching.

VIII. At the end of the oral proceedings, the Board gave the following interlocutory decision:

1. The decision under appeal is set aside.
2. The Respondent's main request is not allowed.
3. The proceedings are continued in writing only to allow the Respondent to supplement the experimental report filed with the letter dated 2 November 2001 with respect to the degree of branching (as defined in the claims of the auxiliary requests) of the terpolymers used in said report.
4. These data have to be submitted to the Board within a period of two months starting with the receipt of the minutes of these oral proceedings.

IX. Under cover of a letter dated 1 October 2004, the Respondent filed a declaration by Dr Armitage to meet the above order of the Board, wherein further analytical data in respect of the terpolymers used in the experimental tests filed with letter of 2 November 2001 were indicated. Specifically, the additional data concerned the molecular weight and the degree of branching for the terpolymers.

In a letter of response, the Appellant questioned the expertise of DrArmitage and the validity of the

Respondent's test results, upon which the latter filed a further declaration in which DrArmitage explains the circumstances of his knowledge in respect of the experimental tests.

- X. In a communication annexed to the summons to attend second oral proceedings, the Board made observations concerning the scope and clarity of the claims of the auxiliary requests. The Board further addressed possible implications of the new data submitted by the Respondent on the validity of the experimental results in relation to the effect achieved by the claimed subject-matter since it was now apparent that the comparative terpolymer differed from those according to the invention not only in that the vinyl ester alkyl chain was a primary instead of a secondary alkyl chain.
- XI. Under cover of a letter dated 18 October 2005, the Respondent filed amended sets of claims in a new first and second auxiliary request and a further experimental report.
- XII. In this letter and at the second oral proceedings held before the Board on 8 December 2005, the Respondent argued that it was believed that the experiments demonstrated that the effect relied upon was only due to the fact that a secondary vinyl ester alkyl chain instead of a primary one was used in the terpolymer. In addition, the Respondent during the second oral proceedings again replaced the auxiliary requests by further amended sets of claims (Sets E and F).

Claim 1 of the first auxiliary (Set E) request differs from Claim 1 as granted (main request) in that the



definition "R<sup>3</sup> represents an alkyl group having up to 4 carbon atoms; and R<sup>4</sup> represents a branched chain alkyl group having from 8 to 15 carbon atoms, other than a tertiary alkyl group, or a branched chain alkyl group having at most 7 carbon atoms" has been amended into "R<sup>3</sup> represents a primary or secondary alkyl group having up to 4 carbon atoms; and R<sup>4</sup> represents a secondary alkyl group having up to 15 carbon atoms".

Claim 1 of the second auxiliary request differs from Claims 1 of the first auxiliary request in that the term "An oil composition comprising an oil and ..." has been replaced by "An oil composition comprising a fuel oil having a wax content below 3% by weight at 10°C below cloud point, and ...".

XIII. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the appeal be dismissed or in the alternative that the patent be maintained on the basis of the Sets of claims E or F filed during the oral proceedings on 8 December 2005.

## **Reasons for the Decision**

### 1. *All Requests*

#### 1.1 Interpretation of the terms "primary", "secondary" and "tertiary" used in Claims 1

In the patent in suit, a list of different alkyl groups exemplifying "a secondary alkyl group" is given

(page 3, lines 28 to 30), including the embodiments isobutyl, isopentyl, neo-pentyl, 2-methyl butyl, isohexyl, 2- and 3-methyl pentyl, 2-ethyl hexyl and 2-methyl heptyl. However, these embodiments do not represent secondary alkyl groups in accordance with the commonly acknowledged nomenclature in organic chemistry, the IUPAC rules, wherein the carbon atom at the point of attachment is bonded to two other carbon atoms, but primary alkyl groups wherein the carbon atom is bonded to only one other carbon atom and a tertiary alkyl group in the case of neopentyl with bonding to three other carbon atoms. At the first oral proceedings, the Respondent recognized that the list of possible embodiments given on page 3 of the patent in suit was defective and both parties agreed that the term "secondary alkyl group" should be interpreted according to the above IUPAC rules.

## 1.2 Amendments and novelty

The Board is convinced that the amendments made in the claims of the auxiliary requests do not violate the provisions under Articles 84 and 123(2) and (3) EPC and that the subject-matter of all requests is novel over the disclosure of D1. Since the Respondent's requests fail for other reasons, no further details need to be given.

## 2. *Inventive Step (main request)*

2.1 The patent in suit as well as D1 both aim at the provision of an oil additive effective to improve the flow properties of the oil at low temperatures by proper modification of the wax crystals (patent in suit,

page 2, lines 6 to 19 and 57 to 58; D1, page 1, line 1 to page 2, line 11 and page 3, first full paragraph).

2.2 Therefore, as agreed by the parties, D1 qualifies as a suitable starting point for the assessment of inventive step.

D1 discloses two embodiments of an oil soluble additive effective to improve low temperature flow of an oil such as fuel oil. It further discloses a fuel or lubricating oil composition comprising such an additive (Claims 1 and 25). Relevant with respect to the claimed subject-matter is only the first embodiment, wherein the additive is a terpolymer containing in addition to units derived from ethylene, units of the formula



and units of the formula



wherein each R independently represents H or CH<sub>3</sub>, and each R<sup>1</sup> and R<sup>2</sup> independently represents a group of the formula OOCR<sup>3</sup>, wherein each R<sup>3</sup> independently represents a hydrocarbyl group, provided that the units of formula I are different from the units of formula II, and in the case that formula I is derived from vinyl acetate, the molar proportion of units I is at least 5%.

Preferably R<sup>3</sup> in formulae I and II of D1 is an alkyl or alkenyl group having up to 30 carbon atoms and being linear. However, it is indicated that it may also be a branched alkyl or alkenyl group, such as a 2-ethylhexyl

group wherein the  $\alpha$ -carbon atom is part of the ethylene group or a iso-butyl group (paragraph bridging pages 5 and 6).

A specific degree of short chain branching, namely 4 methyl groups per 100 methylene units, is given exclusively in the examples representing the first embodiment where a terpolymer is produced by incomplete saponification and re-esterification with lauroyl chloride (Example A) and hexanoyl chloride (Example D) or by incomplete transesterification with methyl octanoate (Example H) of an ethylene-vinyl acetate copolymer.

Also specific combinations of units in a particular terpolymer can be derived from the examples only.

Particularly close to the claimed subject-matter is the composition of Examples 40 and 42 of D1 where the terpolymer of Example H is used in mixture with fuel oils No. 7 and 9 (Table on page 31).

- 2.3 The subject-matter of Claim 1 differs from said compositions containing a terpolymer wherein  $R^4$  is a non-branched, hence linear or straight chain alkyl group in accordance with the preferred embodiments of D1, only in that  $R^4$  is a branched chain, but not tertiary alkyl group having 8 to 15 carbon atoms or a branched chain alkyl group having up to 7 carbon atoms, (page 5, lines 19 to 21, page 6, lines 3 to 4 and 9 to 10).

- 2.4 The Respondent argued that it was apparent from the examples in the patent in suit and from the experimental data filed during the opposition proceedings that the claimed additive performed better or at least comparably well as the prior art additives disclosed in D1 and D6 in a wide variety of different oils and that a person skilled in the art would not have tried the non-preferred alkyl groups of D1 in the expectation of such an improvement.
- 2.5 The Board observes that the experiments given in the patent in suit compare the claimed subject-matter (Examples 1 to 4, Tables 4 and 5) with a copolymer of ethylene and vinyl octanoate (Comparative Example 1), a copolymer of ethylene and vinyl acetate (Comparative Example 2) and a terpolymer according to D6 (Comparative Example 3). However, they do not provide any evidence for an improvement in relation to the additives used in D1. Apart from that, any evidence of an improvement is considered to be of less relevance since D1 teaches that branched chain alkyl groups, specifically the 2-ethylhexyl and the iso-butyl group are also suitable for the purposes aimed at (page 5, lines 21 to 24, and page 6, lines 1 to 8).
- 2.6 The Board notes that the teaching of a document is not limited to its preferred embodiments, so that a person skilled in the art would also consider less preferred ones for the simple reason that they have been suggested as being suitable for the same purpose. In the Board's opinion, a person skilled in the art would, therefore, consider the above teaching of D1 and try branched chain alkyl groups too, in particular the 2-ethylhexyl and iso-butyl groups which are both

specifically mentioned, in the expectation of some benefit or other and despite the preference given in D1 to straight chain alkyl groups.

A benefit is to be expected particularly in those instances where the degree of short chain branching is less than 6 methyl groups per 100 methylene groups since it is known from D3 that copolymers meeting that requirement and being derived from ethylene units and one or more units of ethylenically unsaturated monomers like vinyl acetate, vinyl isobutyrate or vinyl laurate considerably improve the flow properties of an oil (see page 2, first full paragraph to page 4, line 6).

- 2.7 The Board, therefore, concludes that in view of D1 a person skilled in the art would have arrived in an obvious manner at the claimed subject-matter by substituting in the terpolymer H, having a degree of branching of 4 methyl groups per 100 methylene groups contained in the oil compositions of Examples 40 and 42, the linear group derived from the octanoate by the 2-ethylhexyl group specifically mentioned in the description of D1.

Consequently, the main request must fail since the subject-matter of Claim 1 does not meet the requirements of Articles 56 and 52(1) EPC.

3. *Inventive step (first and second auxiliary request)*

- 3.1 When compared with Claim 1 of the main request, Claim 1 of the first auxiliary request has been limited to those embodiments where R<sup>3</sup> is a primary or secondary

alkyl group and R<sup>4</sup> is a secondary alkyl group having up to 15 carbon atoms.

Claim 1 of the second auxiliary request is further limited to those embodiments where the oil is a fuel oil having a wax content below 3% by weight at 10°C below the cloud point (see above point XII).

- 3.2 Concerning the additional amendment in the second auxiliary request, the Board notes that this amendment does not add any further distinguishing feature over Example 40 of D1 where the terpolymer of Example H is used in a fuel having at 10°C below the cloud point a wax content of 2.3% by weight (see also table on page 22 in combination with page 17, last line to page 18, first line).
- 3.3 Further, the terpolymer of Example H contains apart from units of vinyl octanoate where R<sup>4</sup> is a straight chain alkyl group, units of ethylene and vinyl acetate (see above point 2.2). Therefore, the subject-matter of Claim 1 of both auxiliary requests differs from the composition of Example 40 only in that R<sup>4</sup> is secondary alkyl group with up to 15 carbon atoms.
- 3.4 It is credible from the Respondent's experiments filed on 2 November 2001 and supplemented under cover of a letter dated 1 October 2004 as requested by the Board (see VIII above), that the experimental data filed by the Respondent during the opposition proceedings are representative for the claimed subject-matter. In these experiments terpolymers of ethylene/vinyl acetate/vinyl 2-ethylhexanoate having a degree of branching of 3.5 and 4.8, respectively (Examples 1 and 2) according to

the patent in suit have been compared with a terpolymer of ethylene/vinyl acetate/vinyl n-octanoate having a degree of branching of 5.2 (Example 3) according to D1, Example H. It is to be noted that in the above unit derived from vinyl 2-ethylhexanoate R<sup>4</sup> is an unbranched secondary alkyl group, namely a 1-ethylpentyl group as particularly preferred in the patent in suit (page 3, line 30). In comparison, the 2-ethylhexyl group mentioned in D1 (page 5, line 22) is a branched primary alkyl group (see 1.1 above).

It is evident from those experimental data that different results are obtained for different fuels but that in comparison with a terpolymer containing units of vinyl n-octanoate in accordance with D1, a terpolymer containing units of vinyl 2-ethylhexanoate in accordance with Claim 1 provides in all instances some improvement with regard to the cold flow properties of a variety of different oils.

- 3.5 However, it is apparent from the supplementary data that the comparative terpolymer differs from that contained in the composition of Claim 1 not only in that the vinyl ester alkyl chain is a primary one instead of a secondary alkyl chain (n-octanoate instead of 2-ethylhexanoate) but also in a particularly low molecular weight (3150 instead of 3530 and 4641) and a particularly high degree of branching (5.2 instead of 4.8 and 3.4).

The data filed by the Respondent under cover of a letter dated 18 October 2005 in two further examples representing the prior art according to D1 (Example 4) and the claimed subject-matter (Example 5) are not



suitable to change the situation since they show the same trend: lower molecular weight (5970) and higher degree of branching (3.5) for the prior art Example 4 as compared with Example 5 representing the claimed subject-matter (molecular weight of 6730; degree of branching of 2.9). Moreover, the results given in Examples 4 and 5 are not comparable with the data achieved in Examples 1 to 3 since they are obtained in a different fuel.

- 3.6 The Respondent's data are, therefore, insufficient as evidence for an effect provided by the distinguishing feature in relation to Example 40 of D1. On the contrary, they show that any effect obtained in relation of the CFPP (cold filter plugging point) of the fuel may as well depend on the molecular weight and the degree of branching of the terpolymers used, rather than on whether the alkyl group in the terpolymer is primary or secondary. Moreover, as is known from D3 (see 2.6 above), the degree of branching is very likely to influence the cold flow properties in the sense that the cold flow properties increase with decreasing branching.

Therefore, the technical problem actually solved in view of Example 40 of D1 has to be seen to consist in providing an alternative composition suitable to improve the cold flow properties, e.g. the CFPP of fuel oil. It is credible that, in accordance with Claim 1, this problem can be solved by using a terpolymer with vinyl ester units having a secondary instead of a primary alkyl group.

3.7 It remains to be assessed whether, in view of the available prior art documents, it was obvious for someone skilled in the art to solve this problem by the means claimed.

3.8 D1 does not contain any suggestion to use for R<sup>4</sup> any other alkyl group than a primary one, either linear or branched. On the other hand, D6 proposes for the same purpose of improving the cold flow properties of fuel oils terpolymers containing apart from ethylene and vinyl acetate units, units of a vinyl ester in which R<sup>4</sup> is a tertiary alkyl group, namely the vinyl ester of neo-nonanoic acid (page 2, lines 1 to 17 and 50 to 52).

Thus, it has to be stated that both, terpolymers containing vinyl ester units having primary alkyl groups and terpolymers containing vinyl ester units having tertiary alkyl groups, in addition to units of ethylene and vinyl acetate have already been proposed in the art for the purpose of improving the cold flow properties of fuel oils, thereby demonstrating that this difference has, if at all, only a minor influence on the effect aimed at. Therefore, the Board concludes that a person skilled in the art would have expected that of all the theoretical possibilities, the only one not yet disclosed in the prior art, namely terpolymers containing secondary alkyl groups in the vinyl ester unit, would provide an alternative to the prior art, since this was the only remaining alternative left.

The Board, therefore, concludes that it was obvious for someone skilled in the art seeking to provide an alternative cold flow improver for oils to substitute the primary or tertiary alkyl group R<sup>4</sup> in D1 or D6 by a

secondary alkyl group as proposed in the independent Claim 1 of the first and second auxiliary request.

4. For all these reasons, the Board holds that the subject-matter of Claims 1 of both auxiliary requests is not based on an inventive step (Articles 52(1) and 56 EPC).

## **Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

G. Rauh

P. Krasa