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**D E C I S I O N**  
**of 4 February 2004**

**Case Number:** T 0124/02 - 3.3.3

**Application Number:** 91870083.2

**Publication Number:** 0458773

**IPC:** C08F 279/02

**Language of the proceedings:** EN

**Title of invention:**

Monovinylaromatic polymer with improved environmental stress crack resistance

**Patentee:**

FINA TECHNOLOGY, INC.

**Opponent:**

BASF Aktiengesellschaft, Ludwigshafen

**Headword:**

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**Relevant legal provisions:**

EPC Art. 54

**Keyword:**

"Novelty (no) - anticipation by repeat experiment"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0124/02 - 3.3.3

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.3**  
**of 4 February 2004**

**Appellant:** BASF Aktiengesellschaft, Ludwigshafen  
(Opponent) -Patentabteilung - C6-  
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**Representative:** -

**Respondent:** FINA TECHNOLOGY, INC.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office announced 8 November  
2001 and posted 29 November 2001 rejecting the  
opposition filed against European patent  
No. 0458773 pursuant to Article 102(2) EPC.

**Composition of the Board:**

**Chairman:** R. J. Young  
**Members:** P. Kitzmantel  
A. Pignatelli

## Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 458 773 in respect of European patent application No. 91 870 083.2 in the name of FINA TECHNOLOGY, INC., which had been filed on 21 May 1991 claiming two US priorities, both of 21 May 1990, was announced on 10 September 1997 on the basis of 12 claims, independent Claims 1 and 6 reading as follows:

"1. A high-impact monovinylaromatic polymeric composition consisting essentially of an impact-resistant rubber-modified polymer having improved environmental stress-crack resistance, said polymer formed by the polymerization of the monovinylaromatic compound [is] in the presence of the rubber and in which the gel content by weight of said resulting composition is between 20% and 27%, and the rubber utilized consists essentially of a blend of a first rubber having a Mooney viscosity of 50, and a second rubber having a Mooney viscosity of 70."

"6. A thermoplastic composition particularly suitable for manufacturing food containers for packaging oily and fatty foods, said composition characterized by high impact strength and high environmental stress crack resistance, and comprising:

a polymer formed by the polymerization of a monovinylaromatic compound in the presence of a high molecular weight oil-extended rubber having a Mooney viscosity of 90, said rubber being extended with a food-grade oil

and wherein the rubber component in said composition is maintained at a level sufficient to provide a gel content of 20 to 27 percent by weight of the composition."

Independent Claims 7 and 10 are process claims which are essentially directed to the production of the compositions of, respectively, Claims 1 and 6.

The further claims are dependent, respectively, on Claim 1 (Claims 2 to 5), Claim 7 (Claims 8 and 9) and Claim 10 (Claims 11 and 12).

II. Notice of Opposition requesting revocation of the patent in its entirety on the grounds of Art. 100(a) EPC was filed by BASF AG on 10 June 1998.

The opposition was *inter alia* based on documents

D1: DE-A-3 821 129,

D2: US-A-4 362 850,

D3: DE-B-2 620 853,

D4: US-A-4 144 204, and

D5: GB-A-1 078 007.

III. By its decision announced orally on 8 November 2001 and issued in writing on 29 November 2001, the Opposition Division rejected the opposition.

That decision held that the subject-matter of Claims 1 and 7 was novel because it could only be constructed from the disclosure of D1 by four-fold selection and from the disclosure of D2 by three-fold selection. The Opponent's reworking of Example 3 of D1 was disregarded because it used a lower viscosity rubber component whose Mooney and solution viscosities diverged from those according to this Example 3, and because it also used a different second step polymerisation, i.e. a suspension polymerisation in a stirred vessel in lieu of D1's "Waffeleisen" technique.

The decision furthermore recognized the novelty of the subject-matter of Claims 6 and 10 over D5 and the presence of an inventive step of the subject-matter of all claims over the citations D1 to D5.

- IV. On 31 January 2002 the Opponent (Appellant) lodged an appeal against the decision of the Opposition Division and paid the appeal fee on the same day. The Statement of Grounds of Appeal was filed on 4 April 2002.
  
- V. The arguments of the Appellant presented in its written submissions and at the oral proceedings held on 4 February 2004, insofar as they are relevant for this decision, may be summarized as follows:
  - (a) The reasons of the decision under appeal only repeated the preliminary opinion expressed by the Opposition Division in its communication of 30 July 1999 and did not take account of the Opponent's written comments of 25 November 1999, nor of its submissions at the oral proceedings on 8 November 2001.

(b) Contrary to Article 125 EPC, the Opposition Division relied in its decision on the Patentee's criticism, advanced for the first time at the oral proceedings, of the use, according to the Opponent's test report of 10 June 1998, of a second step polymerisation different from that described in Example 3 of D1 itself; as a consequence of that the burden of proof was put unfairly on the Opponent whose only possible defence at the oral proceedings was to advance counter arguments.

(c) Example 3 of D1 was novelty destroying for the subject-matter of independent Claims 1 and 7 because it met their Mooney viscosity and gel content requirements:

(i) As to the Mooney viscosities, there was no difference in the value of 50 of the respectively used lower viscosity components and the numerical difference between the values of 70 (present Claim 1) and 62 (D1, Example 3) of the higher viscosity components was of no practical consequence because these numbers represented approximate values which in reality related to ranges of values. This was confirmed by the use according to samples B, C and D (Table I of the patent in suit) of a 55 Mooney viscosity rubber for the rubber component which according to Claim 1 should have a Mooney viscosity of 50, i.e. establishing a deviation of 10%; in

consequence, the viscosity value of 70 of the higher viscosity component of Claim 1 - when allowing for the same inaccuracy of 10% - comprised a value of 63.

(ii) Furthermore, what was decisive according to Claim 1 of the patent in suit was not the Mooney viscosity of the two starting rubber components but the Mooney viscosity of their blend, i.e. a value between 50 and 70. It was evident that the 1:1 mixture of the 50 and 62 viscosity rubbers used according to Example 3 of D1 had a Mooney viscosity within this range.

(iii) As to the gel content, it was established by the Opponent's repeat experiment of Example 3 of D1 that this was 25% and thus within the claimed range of 20 to 27%.

It was of no consequence for this gel content result that the second polymerisation stage of the repeat experiment was carried out in suspension and not in a "Waffeisen" (cf. D1, page 4, lines 4 to 11) because the gel formation (grafting, formation of polystyrene occlusions) was essentially terminated after the first polymerisation stage.

VI. The submissions of the Respondent in its letter dated 16 October 2002 and at the oral proceedings, as far as they are relevant for this decision, may be summarized as follows:

- (a) The disclosure of document D1 was not novelty destroying for the subject-matter of Claims 1 and 7 of the patent in suit.
- (b) This conclusion was to be made in spite of the disclosure of Example 3 of D1 because the Mooney viscosity value of 62 of the higher viscosity rubber used according to this example was different from the value of 70 required by present Claim 1 and because this Example 3 failed to indicate the gel content of the resulting composition.
- (c) With regard to the different Mooney viscosity values of the higher viscosity components the Respondent emphasized that this was a distinguishing difference that could be ascertained on the ultimate composition by gel permeation chromatography because the different Mooney viscosities reflected in fact different molecular weights which would not after blending "disappear" and/or merge with the molecular weight distribution characteristics of the lower viscosity rubber component into a single broad molecular weight peak but would remain recognisable in the blend's gel permeation chromatogram as distinct peaks.
- (d) Furthermore the missing information of the gel content of this component could not be made up by the Opponent's repetition of this example which led to a gel content value of 25% because the conditions of this reworking experiment differed



from those used according to D1 not only by the slightly lower Mooney viscosity of 49 of the Li-polybutadiene (as compared to 50) but, more importantly, by the use of totally different conditions of the second step polymerisation: not in a "Waffeleisen" but in aqueous suspension.

- (e) However, despite the afore-mentioned criticism of the Opponent's reworking of Example 3 the Respondent agreed at a later stage of the oral proceedings to the Appellant's contention that the different conditions of the second step polymerisation did not play any significant role for the gel content of the ultimate composition because this characteristic was essentially defined by the first step polymerisation.

VII. 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.

### **Reasons for the Decision**

1. The appeal is admissible.
2. *Interpretation of Claim 1*
  - 2.1 The feature in Claim 1 that "the rubber utilized consists essentially of a blend of a first rubber having a Mooney viscosity of 50, and a second rubber having a Mooney viscosity of 70" is a product-by-process feature whose significance as distinguishing

feature depends on whether the different Mooney viscosities of the two rubber components can be determined in the final composition which exhibits an average value of the Mooney viscosity lying between 50 and 70 (cf. Table 1 on page 4 of the patent specification, especially the first footnote relating to the Mooney viscosity of samples B, C and D).

2.2 In the Board's judgment, it is not possible reliably to conclude from a rubber composition having a Mooney viscosity value between 50 and 70 that this value was the result of the blending of two rubbers having Mooney viscosities of 50 and 70. Consequently, this product-by-process feature cannot be regarded as a characteristic able in any case to distinguish compositions which have been prepared by blending two rubber components having Mooney viscosities of 50 and 70 from rubber compositions having a Mooney viscosity between 50 and 70 which have not been prepared in that manner.

2.3 The Respondent's argument is not convincing that the Mooney viscosities of the components of a two-rubber blend could in any case be reliably ascertained by determination of the molecular weight distribution by gel permeation chromatography:

2.3.1 Firstly, while there is a certain proportionality between Mooney viscosity and molecular weight, it is impossible exactly to calculate the Mooney viscosity of a rubber composition from its gel permeation chromatogram because the latter characteristic is not the only parameter influencing the torque of a Mooney viscosimeter. Another important parameter is eg the

degree of linearity/branching of the polymer molecules which is not defined in present Claim 1.

2.3.2 Secondly, Claim 1 places no limitation on the molecular weight distribution of the single rubber components; hence the molecular weight spectrum of a blend of the single components need not necessarily exhibit two clearly distinct peaks; broad peaks of the single components might as well merge into a common peak formation, thus prohibiting any serious conclusion as to the molecular weight characteristics of the blend components.

2.3.3 Thirdly, the situation outlined in the preceding paragraph might even be more complicated if one considers the possibility of polydisperse rubber components. On the one hand the molecular weight characteristic of a blend from such rubber components would allow even less accurate assumptions as to the molecular weight/Mooney viscosity of its components, and on the other hand it would be impossible to tell a single component bimodal rubber composition from a two component blend exhibiting the same or a similar molecular weight distribution characteristic.

### 3. *Novelty*

3.1 Document D1, Claim 1, relates to a process for the preparation of thermoplastic moulding compositions by polymerisation of 75 to 99 parts by weight of ethylenically unsaturated monomers in the presence of 1 to 25 parts by weight of a diene polymer comprising A. diene polymers having *inter alia* a Mooney viscosity of 30 to 80 ML (1+4) 100°C (preferably 40 to 70 ML) and B.

diene polymers having *inter alia* a Mooney viscosity of 30 to 100 ML (1+4) 100°(preferably 40 to 70 ML) (see also page 2, lines 16 to 35).

Example 3 (page 3, line 24 to page 4, line 32) describes the polymerisation of styrene in the presence of a mixture of two rubber components:

Polybutadiene A, specified as "Nd-Polybutadien" having *inter alia* a Mooney viscosity (MV) = 62 ML(1+4)100°C and a solution viscosity (LV) > 1000 mPa.s; and

Polybutadiene B, specified as "Li-Polybutadien" having *inter alia* a Mooney viscosity (MV) = 50 ML(1+4)100°C and a solution viscosity (LV) 71 mPa.s.

3.2 In view of the considerations set out in section 2 above and in view of the ensuing conclusions, the fact that the Mooney viscosity of the Polybutadiene A is lower than the value of 70 specified for the higher viscosity component in present Claim 1 cannot be regarded as distinguishing.

3.2.1 Firstly, the 1:1 blend according to Example 3 of D1 will inevitably have an average Mooney viscosity value between 50 and 62, i.e. within the range of 50 to 70 resulting from the blending process of the two rubber components according to present Claim 1.

3.2.2 Secondly, in view of the identity of the Mooney viscosity of 50 of the lower viscosity components, and of the closeness of the Mooney viscosities of, respectively, 70 and 62 of the higher viscosity components, on the one hand according to present

Claim 1 and on the other hand according to Example 3 of D1, the gel permeation chromatograms of these two blends (assuming - as necessary for this evaluation - similar polydispersities and molecular structures of the components as well as similar mixing ratios) will resemble each other to an extent that a reliable conclusion as to the numerical characteristics of the slightly different molecular weight distributions of the respective higher viscosity rubber components of the blends is effectively ruled out. Even less is there a possibility to ascertain the corresponding Mooney viscosity values (cf. paragraph 2.3.1 above). This conclusion is furthermore reinforced by the margin of inaccuracy of up to 10% of the numerical values of the Mooney viscosities which can be inferred from the patent specification itself (cf. paragraph V(c) above) which narrows the gap, if any, between the values of 62 and 70.

- 3.3 It remains however to be decided whether the composition according to Example 3 of D1 also complies with the gel content requirement of present Claim 1, i.e. whether this content, which is not explicitly disclosed in D1, *de facto* is in the range between 20 and 27 % by weight of the composition.
- 3.4 In order to establish that this was indeed the case, an experimental report comprising a repetition of Example 3 of D1 had been filed with the opposition statement. This report indicates a gel content of 25%, i.e. within the claimed range.
- 3.5 The question whether the composition according to Example 3 of D1 was novelty destroying for the subject-

matter of present Claim 1 thus hinges on the reliability of this repeat experiment which in the following aspects deviates from the model:

- (a) As compared to said example, the "Nd-Polybutadien" used in the repeat experiment had the same Mooney viscosity (MV) of 62; its solution viscosity (LV) was 1500 mPa.s, not (just) >1000 mPa.s;
- (b) The "Li-Polybutadien" used in the repeat experiment had a Mooney viscosity (MV) of 49 (instead of 50 according to said example) and a solution viscosity (LV) 71 mPa.s (instead of 75 mPa.s);
- (c) The second step polymerisation was carried out in the repeat experiment in aqueous suspension in a stirred vessel (as compared to in "drucksicheren Waffeleisen" according to said example).

3.6 In the Board's judgment, the minor Mooney Viscosity discrepancy of "Li-Polybutadien" as well as the minor deviations, if any, of the solution viscosities of the two rubber components could at most have a very insubstantial influence on the gel content.

3.7 As to the impact of the different second step polymerisation conditions, the Board has to rely on the submission of the Patentee Respondent itself who admitted at the oral proceedings before the Board that this difference was without consequence for the gel content because this compositional feature was essentially determined by and fixed after the first polymerisation step. In making that admission, the

Respondent expressly resiled from its position before the Opposition Division, namely that most of the grafting of monvinylaromatic polymer onto the dispersed rubber phase occurred at the second stage polymerisation (decision under appeal, Reasons 3.1).

3.8 In view of this admission of the correctness of the gel content value of 25% determined by the Appellant's reworking of Example 3 and in view of the conclusions drawn in paragraph 3.6 above with regard to the Mooney and solution viscosities, no other conclusion can be drawn than that Example 3 of D1 is prejudicial to the novelty of the subject-matter of present Claim 1.

4. The Appellant's criticism of the alleged insufficient consideration in the decision under appeal of some of its submissions before the Opposition Division (cf. section V(a) above), is unfounded because it is apparent from the Minutes of the oral proceedings before that instance that the Appellant (then Opponent) had had the opportunity to present its case and that all relevant issues have been duly considered in the decision under appeal.

Similarly, the Opposition Division did not commit any procedural violation in its appreciation of the Opponent's test report (comprising its repetition of Example 3 of D1) which had already been filed with the opposition brief. Under the concept of free evaluation of evidence established in the EPO's case law, which is in agreement with the principles of procedural law generally recognised in the Contracting States referred to in Art. 125 EPC, there was no obligation for the Opposition Division to require the Patentee to produce

counter-evidence and thereby change the burden of proof which in opposition proceedings is in principle with the Opponent.

## **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:

E. Görgmaier

R. Young