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**Datasheet for the decision
of 16 February 2017**

Case Number: T 2553/12 - 3.3.03

Application Number: 06760563.4

Publication Number: 1910464

IPC: C08L33/04, C08L33/06,
C08L35/02, B32B7/02

Language of the proceedings: EN

Title of invention:

MULTI-LAYER COMPOSITION

Patent Proprietor:

ARKEMA FRANCE

Opponent:

Evonik Röhm GmbH

Relevant legal provisions:

EPC Art. 56, 84, 100(b)

Keyword:

Sufficiency of disclosure - (yes)
Claims - lack of clarity no ground for opposition
Inventive step - non-obvious modification

Decisions cited:

G 0003/14, T 0301/87, T 0656/07



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Case Number: T 2553/12 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 16 February 2017

Appellant: Evonik Röhm GmbH
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Decision under appeal: **Interlocutory decision of the Opposition**
Division of the European Patent Office posted on
18 October 2012 concerning maintenance of the
European Patent No. 1910464 in amended form.

Composition of the Board:

Chairman D. Semino
Members: F. Rousseau
C. Brandt

Summary of Facts and Submissions

I. The appeal lies from the interlocutory decision of the Opposition Division posted on 18 October 2012 according to which European patent No. 1 910 464 as amended according to the documents of the main request submitted during the oral proceedings on 18 September 2012 meets the requirements of the EPC.

II. Claims 1, 12 and 16 of that request read as follows:

"1. An acrylic multi-layer composition comprising from the outside in:

a) an outer layer comprising an acrylic polymer matrix and from 5 to 60 weight percent, based on the total outer layer composition, of a hard-core core/shell impact modifier having at least three layers having an average particle size of less than 225 nm, wherein said hard-core has a Tg of greater than 0 degrees centigrade, preferably greater than 25 degrees centigrade and more preferably greater than 40 degrees C; and

b) an inner layer comprising a thermoplastic acrylic polymer matrix and from 4 to 60 weight percent, based on the total inner layer composition, of impact modifier having an average particle size of greater than or equal to 225 nm.

12. A multi-layer composite structure comprising, from outside to inside:

- 1) an acrylic multi-layer composition as defined in any of the preceding claims
- 2) a substrate.

16. An article comprising the multi-layer acrylic composition of claim 1."

Claims 2 to 11, 13 to 15 and 17 to 18 were dependent claims of claims 1, 12 and 16, respectively.

III. During opposition proceedings, the following documents inter alia were cited:

D8:US-A-5 700 566

D18b: EP-A-1 541 339

D19: JP-A-2005-200502

D27: JP-A-06-179794

IV. According to the reasons for the decision, the amended set of claims met the requirements of Articles 123(2), (3) and 54 EPC, which was not disputed by the opponent. As regards sufficiency of disclosure, the skilled person understood that the impact modifiers to be used for preparing the multi-layered composition should have the particle size defined in the claims, which impact modifiers were well-known in the art, their size being measurable using known methods. Regarding inventive step, the closest prior art was represented by the disclosure of D18b. The opposition division was satisfied that the claimed multi-layer acrylic composition presented an excellent balance of weatherability, chemical resistance, abrasion resistance, and gloss after thermoforming. As none of the documents cited in the procedure, reference being to D8 and D27, suggested to use impact modifiers of different particle sizes in different layers, let alone to obtain such results, an inventive step was acknowledged.

- V. The opponent (appellant) lodged an appeal against that decision and submitted with the statement setting out the grounds of appeal document D27b which is a human-made translation of D27.
- VI. The rejoinder of the patent proprietor (respondent) of 20 September 2013 included three auxiliary requests.
- VII. Following the Board's communication sent in preparation of the oral proceedings, the appellant announced with letter of 23 December 2016 that they would not attend the oral proceedings.
- VIII. Oral proceedings held on 16 February 2017 took place in the announced absence of the appellant.
- IX. So far as relevant to the present decision, the appellant's arguments can be summarised as follows:
- (a) The particle size of the impact modifiers was that when present in the polymer matrix. Owing to the absence of any indication of the size of the impact modifier before introduction in the matrix and the difficulty to measure the size of the impact modifier when present in the matrix, the skilled person could not perform the invention.
 - (b) The same issues resulted additionally in a lack of clarity. Clarity of the subject-matter of amended claim 1 could be objected to because the introduction of the features that the impact modifier had at least three layers and that the thermoplastic polymer matrix of the inner layer was a thermoplastic acrylic polymer matrix aggravated the lack of clarity of claim 1 as granted.

Reference was made to T 0656/07 of 6 May 2009 (not published in the OJ EPO).

- (c) The applicant had not shown that the effect described in the patent in suit could be obtained over the whole area claimed, because no upper limit was defined for the impact modifier of the inner layer. Already for that reason the subject-matter of claim 1 did not involve an inventive step.

- (d) Additionally, D18b represented the closest state of the art. The problem underlying the patent in suit was to obtain a good combination of weatherability, chemical resistance, abrasion resistance, gloss and good impact resistance. Apart from the gloss which had to be improved in combination with good impact resistance, those properties were generally known properties of impact modified polymethylmethacrylate, which were not caused by the use of two different impact modifiers. Having regard to the disclosure of D18b the objective problem solved was therefore the provision of an impact resistant multi-layer composition exhibiting particularly good gloss values and sufficient impact properties. The use of impact modifiers having a average particle size of less than 225 nm was suggested by D19, D8 and D27. Accordingly, claim 1 lacked an inventive step.

X. So far as relevant to the present decision, the respondent's arguments can be summarised as follows:

- (a) The size of the impact modifier particles defined in claim 1 corresponded to the size before incorporation into the matrix which was measurable by dynamic light scattering and was the same when

present in the matrix. The patent in suit provided sufficient information concerning the various components to be used for the claimed compositions and also examples of the invention. Accordingly, the claimed invention was sufficiency disclosed.

(b) The amendments made with respect to claim 1 as granted did not interact with the other features of the claim and were clear.

(c) D18b represented the closest prior art. Gloss retention was improved as demonstrated by examples 1 to 3 of the patent in suit. Based on that effect, the technical problem was the same as that identified in paragraph [7] of the patent, namely providing a composition leading to an excellent balance of weatherability, chemical resistance, abrasion resistance, and gloss after thermoforming. None of the cited documents stated the problem of gloss retention after thermoforming. In addition D19 was not prior art pursuant to Article 54(2) EPC. Consequently, the claimed solution, in particular the size of the impact modifier in the outer layer, was not suggested by the prior art to solve this specific effect. An inventive step was therefore to be acknowledged.

XI. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

XII. The respondent requested that the appeal be dismissed, or in the alternative that the decision under appeal be set aside and the patent be maintained on the basis of the claims of one of the first to third auxiliary requests, all filed with letter of 20 September 2013.

Reasons for the Decision

Main Request

Lack of sufficiency

1. The question to be answered is whether the patent in suit provides sufficient information which enables the skilled person to perform the invention as defined in the claims, throughout the whole area claimed, taking into account common general knowledge. This includes in the present case examining whether the patent in suit makes available to a person skilled in the art the combination of features defining the claimed acrylic multi-layer compositions.
 - 1.1 The appellant's objection is based on an interpretation of claim 1 according to which the size of the impact modifier is determined when the impact modifiers are embedded in the polymer matrix. This, however, is neither suggested by the terms of the claims, nor by any other passage of whole patent.
 - 1.2 The normal rule of claim construction is that the terms used in a claim should be given their broadest technically sensible meaning in the context of the claim in which they appear. In the present case each layer of the claimed composition is not only defined by the size of the impact modifier, but also by the amount of core-shell particles in weight percentages, the outer layer being also defined by the Tg of the hard-core of the impact modifier present in that layer. Both layers are also defined to comprise an acrylic polymer.

- 1.3 Faced with the composition of claim 1, the skilled reader would immediately recognize, as shown by the appellant's submissions, the lack of practicality and difficulties associated with any measurement of the size of the impact modifier when embedded in the film, especially when the polymeric matrix and the shell are made of the same material. This also holds true for measuring on the final multi-layer composition the weight percentage of impact modifier and the Tg of the hard-core of one of the impact modifiers, which would among others necessitate separation of the layers and separation of the impact modifiers from each layer in which they were embedded.
- 1.4 Accordingly, based on the sole technically sensible reading of present claim 1 all parameters of said claim (in particular Tg of the core of one of the impact modifier and the size of the impact modifiers) cannot be understood to define results of measurements carried out on the multi-layer composition, but rather simply the proportions of the ingredients and the nature of the impact modifiers (Tg and particle size) to be employed for preparing the multi-layer product. This is not contradicted by the specification and even confirmed by the examples of the patent in suit (paragraphs [33] to [36]), according to which in particular the size of the modifier particle size is said to have been measured by dynamic light scattering, i.e. a method that is not suitable for determining the size when the particles are in the matrix as argued by the appellant.
- 1.5 Hence, the objection of the appellant which is merely based on an unrealistic technical reading of claim 1 cannot convince.

1.6 Furthermore, it was not disputed that impact modifiers as defined in present claim 1 are ingredients conventional in the art and that at the date of filing of the patent the skilled person using known blending techniques for preparing the various mixtures of impact modifiers and matrix polymer and using conventional techniques, described for example in paragraphs [25] to [29] of the patent in suit, would be able to prepare the claimed multi-layer compositions.

1.7 Therefore, the patent in suit provides sufficient information which enables the skilled person taking into account common general knowledge to prepare the acrylic-multi layer compositions as defined in operative claim 1 throughout the whole area claimed. Accordingly, no case has been made that the claimed subject-matter lacks sufficiency of disclosure.

Clarity

2. In its decision G 3/14 (OJ EPO 2015, 102) the Enlarged Board of Appeal approved the conventional line of jurisprudence as exemplified by T 301/87 (OJ EPO 1990, 335) and answered that "in considering whether, for the purposes of Article 101(3) EPC, a patent as amended meets the requirements of the EPC, the claims of the patent may be examined for compliance with the requirements of Article 84 EPC only when, and then only to the extent that the amendment introduces non-compliance with Article 84 EPC". The diverging practice according to which a lack of clarity could be examined if the amendment "highlights and focuses attention" on a previously existing ambiguity, in particular as was held in T 0656/07 (*supra*) invoked by the appellant, was rejected by the Enlarged Board of Appeal.

In the present case the sole amendments introduced into claim 1 as granted are that the impact modifier used in the outer layer has at least three layers and that the thermoplastic polymer is of the acrylic type. The lack of clarity addressed by the appellant relates to the absence of a method of measurement in the claim that would allow a clear definition of the particle size. Hence, the alleged lack of clarity would already have existed in claim 1 as granted and is not the result of the amendments introduced in claim 1. Accordingly, claim 1 of the main request may not be examined for compliance with the requirements of Article 84 EPC with regard to the objection of the appellant.

Inventive step

3. *Closest state of the art*

3.1 Both in the decision under appeal and in the arguments of the appellant the multi-layer acrylic film according to document D18b is considered to represent the closest prior art. This was not disputed by the respondent and the Board sees no reason to take a different approach.

3.2 The multi-layer acrylic film according to claim 1 of D18b has a thickness between 40 and 300 μm and comprises in this order:

(i) a layer A prepared with a thermoplastic acrylic composition (A) comprising from 75 to 95% of a methacrylic (co)polymer containing mostly methyl methacrylate units and from 5 to 25% of an impact modifier;

(ii) a layer B1 prepared with a composition (B1) comprising from 10 to 50% of a methacrylic (co)polymer

as defined for layer A and from 50 to 90% of an impact modifying compound;

(iii) a layer C prepared with a thermoplastic acrylic composition (C) comprising from 75 to 95% of a methacrylic (co)polymer as defined for layer A and from 5 to 25% of an impact modifier; the layers A, B1 and C being joined together in their respective contact zones.

3.3 The impact modifier to be incorporated in compositions (A), (B1) and (C) can be of various types, in particular a latex of "hard-soft-hard" morphology as described in paragraphs [45] and [46], i.e. a three layer morphology with a hard core, an intermediate elastomeric layer and an outer hard layer, hard meaning in view of paragraph [38] a thermoplastic (co)polymer whose glass transition temperature is at least 25°C. The size of the impact modifier is generally comprised between 60 and 5000 nm, preferably between 80 and 300 nm (paragraph [37]).

3.4 However, in D18b no distinction is made among the sizes of the impact modifier in the various layers, so that the document does not disclose that the impact modifier when used in the outer layer of the above film has an average particle size of less than 225 nm in combination with an impact modifier in the intermediate layer having an average particle size of greater than or equal to 225 nm.

4. *Problem and solution*

4.1 It is undisputed that the claimed acrylic multi-layer compositions provide a suitable balance of impact properties, weatherability, chemical resistance and abrasion resistance. The appellant indicated that

weatherability, chemical resistance and abrasion resistance were known properties of impact modified polymethylmethacrylate. The appellant also acknowledged that the claimed acrylic multi-layer compositions exhibited particularly good gloss values and sufficient impact properties, agreeing to the indication in paragraph [21] of the patent in suit, that larger impact modifier particles were known to provide better impact properties.

4.2 With respect to the gloss properties, the patent in suit as shown in paragraphs [7] and [19] and the examples is not merely concerned with the problem of providing high gloss acrylic multi-layer compositions, but acrylic multi-layer compositions which retain their gloss properties after thermoforming. According to said paragraph [19], and as illustrated by the results of the experimental part of the patent in suit summarized in Table 1, reduction of the gloss properties upon thermoforming can be minimized when the impact modifier contained in the outer-layer has a size of less than 225 nm in diameter. The experimental results of Table 1 are meant to show that modifiers of different size (175 nm and 300 nm) contained in the outer-layer bring about almost the same gloss (60°) value of the multi-layer structure before thermoforming. However, thermoforming such multi-layer structures leads to a reduction of gloss, which reduction is exacerbated when the impact modifier has a size of 300 nm.

4.3 The appellant did not provide counter experiments or technical explanation that would put the credibility of the above experimental results into question. Neither did they disprove the statement to be found in paragraph [19] of the patent in suit according to which "*The smaller size of the impact modifier, compared to*

typical 3-layer impact modifiers, enables the outer layer to retain its gloss after thermoforming. An outer acrylic layer having hard core impact modifiers with a particle diameter of greater than or equal to 225 nm at the same loading level show a poor gloss retention after thermoforming". Under these circumstances the Board must accept that the use in the outer layer of an impact modifier having an average particle size of less than 225 nm allows optimization of gloss retention after thermoforming.

- 4.4 Accordingly, in view of the considerations in above points 4.1 to 4.3 the Board concludes that the technical problem which can be considered to be successfully solved over the disclosure of D18b is the provision of acrylic multi-layer compositions having an excellent balance of weatherability, chemical resistance, abrasion resistance, as well as sufficient impact properties and improved retention of gloss after thermoforming.
- 4.5 The solution to this problem as defined by the acryl multi-layer composition according to operative claim 1 is characterized *inter alia* by the use of a hard-core core/shell impact modifier having at least three layers and an average particle size of less than 225 nm in the outer layer and an average particle size of greater than or equal 225 nm in the inner layer.

5. *Obviousness*

5.1 It remains to decide whether or not the solution to the above problem is obvious in view of the state of the art.

5.2 Although D18b in paragraph [4] mentions the thermoforming ability of thermoplastic acrylic resins in general, that document does not contain any teaching with respect to a thermoforming process of the acrylic multi-layer structures disclosed therein. Accordingly, it cannot suggest that a thermoforming process would impair the gloss properties of the articles disclosed in that document and, a fortiori, lead the skilled person to the claimed solution.

5.3 The argument of the respondent that none of the documents cited by the appellant, namely D8, D19 and D27, addresses the question of gloss retention after thermoforming has not been disputed by the appellant, whose written submissions merely address gloss (if at all), but not gloss retention after thermoforming (emphasis added by the Board). It was also not disputed as indicated by the respondent that D19 is not prior art pursuant to Article 54(2) EPC.

5.4 Therefore, there is no case made out by the appellant that the skilled person in view of the prior art available would have arrived at the subject-matter of present claim 1 in an obvious manner.

5.5 The appellant submitted a second line of argumentation with respect to lack of an inventive step (see above section IX (c)), which additional argumentation, contrary to the requirements of Article 56 EPC, was not

made having regard to the state of the art and therefore cannot be successful either.

6. Consequently, the subject-matter of present claim 1 and by the same token that of dependent claims 2 to 11, as well as the subject-matter of claims 12 to 18 directed to articles comprising an acrylic multi-layer composition as defined in claim 1 meets the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



P. Martorana

D. Semino

Decision electronically authenticated