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**Datasheet for the decision
of 7 September 2021**

Case Number: T 2275/17 - 3.3.06

Application Number: 09015803.1

Publication Number: 2202058

IPC: B32B5/08, B32B25/08

Language of the proceedings: EN

Title of invention:

Composite material and method for preparation thereof

Patent Proprietor:

Daicel-Evonik Ltd.

Opponent:

ARKEMA FRANCE

Headword:

Evonik/Composite

Relevant legal provisions:

EPC Art. 123(3)

RPBA 2020 Art. 13(1), 13(2)

Keyword:

Amendment - allowable (no), opponent is given the benefit of doubt because proprietor has not discharged its burden of proof.

Amendment after summons - exceptional circumstances (no)

Amendment to appeal case - suitability of amendment to resolve issues raised (no)

Decisions cited:

T 0307/05, T 1764/06, T 1920/09, T 2285/09, T 0370/10

Catchword:



Beschwerdekammern

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Case Number: T 2275/17 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 7 September 2021

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
1 August 2017 concerning maintenance of the
European Patent No. 2202058 in amended form.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: S. Arrojo
R. Cramer

Summary of Facts and Submissions

I. This appeal was filed by the opponent (appellant) against **the decision of the opposition division to maintain European patent No. 2 202 058 on the basis of auxiliary request 3 as filed during oral proceedings on 4 July 2017**. Claim 1 thereof reads (amendments with respect to claim 1 as granted highlighted by the board):

*"1. A composite comprising
a vulcanized rubber member formed by a vulcanization of a non-silicone-series unvulcanized rubber, and
a resin member comprising a thermoplastic resin and directly bonded to the rubber member,
whereby said composite comprises a combination of a rubber member vulcanized with a radical-generating agent and a resin member comprising a thermoplastic resin having at least 2 atoms, on average, selected from a hydrogen atom and a sulfur atom per molecule, and each atom has an orbital interaction energy coefficient S of not less than 0.006,
wherein the orbital interaction energy coefficient S is represented by the following formula (1):*

$$S[eV^{-1}] = (C_{HOMO,n})^2 / |E_c - E_{HOMO,n}| + (C_{LUMO,n})^2 / |E_c - E_{LUMO,n}| \quad (1)$$

wherein each of E_c , $C_{HOMO,n}$, $E_{HOMO,n}$, $C_{LUMO,n}$ and $E_{LUMO,n}$ represents a value calculated by a semi-empirical molecular orbital method MOPACPM3, E_c representing an orbital energy (eV) of a radical of the radical-generating agent and being -8eV for an organic peroxide, $C_{HOMO,n}$ representing a molecular-orbital coefficient of a highest occupied molecular orbital (HOMO) of an n -th hydrogen or sulfur atom constituting

a constitutive unit of the thermoplastic resin, $E_{HOMO,n}$ representing an orbital energy (eV) of the HOMO, $C_{LUMO,n}$ representing a molecular-orbital coefficient of a lowest unoccupied molecular orbital (LUMO) of the n -th hydrogen or sulfur atom constituting the constitutive unit of the thermoplastic resin, and $E_{LUMO,n}$ representing an orbital energy (eV) of the LUMO;

whereby said constitutive unit means a modeling molecular structure comprising a polymer terminal and 1 to 3 repeating unit, ~~(s)~~ provided that said combination excludes the following combinations (1) to (3);

(1) a combination of an aliphatic polyamide-series resin having an amino group and an unvulcanized rubber having a carboxyl group or an acid anhydride group,

(2) a combination of an aliphatic polyamide-series resin and an unvulcanized rubber comprising a silane compound, and

(3) a combination of an epoxy group-containing resin and an unvulcanized rubber having a carboxyl group or an acid anhydride group; and

wherein said combination is any of the following combinations:

(a) a combination of a polyamide-series resin in which the ratio (molar ratio) of terminal amino group/terminal carboxyl group is 50/50 to 100/0, wherein an active hydrogen atom of the polyamide-series resin comprises only hydrogen atoms of the terminal amino group, wherein the active hydrogen atom is an atom having an orbital interaction energy coefficient S of not less than 0.006, and an unvulcanized rubber comprising an organic peroxide and a polyfunctional vulcanization-activating agent,

wherein the polyfunctional vulcanization-activating agent comprises at least one member selected from the group consisting of a triallyl (iso)cyanurate, a tri-

or poly-functional (meth)acrylate; and an aromatic maleimide compound;

wherein the tri- or polyfunctional {meth}acrylate is selected from the group comprising glycerol tri(meth)acrylate, trimethylolethane tri(meth)acrylate, trimethylolpropane tri(meth)acrylate, pentaerythritol tri(meth)acrylate, pentaerythritol tetra(meth)acrylate, dipentaerythritol tetra(meth)acrylate, dipentaerythritol hexa{meth}acrylate.

~~(b) a combination of a polyamide series resin in which the ratio (molar ratio) [...! comprises an organic compound having at least two polymerizable unsaturated bonds per molecule."~~

- II. In its statement of grounds of appeal, the appellant presented objections under Articles 76, 123(2) and (3), 83, 54 and 56 EPC.
- III. With its reply dated 25 April 2018, the patent proprietor (respondent) contested these objections and submitted amended sets of claims labelled auxiliary requests 1 to 29.
- IV. In response to the board's preliminary opinion that the main request and auxiliary requests 1 to 29 did not appear to meet the requirements of Article 123(3) EPC, the proprietor with a letter dated 21 April 2021 submitted new auxiliary requests 30 to 33.
- V. With a letter dated 6 July 2021, the opponent requested not to admit these new requests into the appeal proceedings.
- VI. With a further letter dated 3 September 2021, the proprietor submitted new auxiliary requests 1b to 33b.

VII. At the oral proceedings, which took place on 7 September 2021, the discussion focused on the allowability of the different sets of claims under Article 123(3) EPC and admissibility of the late filed requests. Before closing the debate, the parties confirmed their requests to be the following:

The appellant requested to set aside the decision under appeal and to revoke the patent in its entirety.

The respondent requested to dismiss the appeal and to maintain the patent on the basis of the claims upheld by the opposition division, or, as an auxiliary measure, to maintain the patent on the basis of one of auxiliary requests 1 to 29 filed on 25 April 2018, or of auxiliary requests 30 to 33 filed on 21 April 2021, or of auxiliary requests 1b to 33b filed on 3 September 2021.

Reasons for the Decision

1. Main request - Allowability of the amendments

For the board the requirements of Article 123(3) EPC are not met for the following reasons:

1.1 The alleged invention concerns a composite comprising a combination of a rubber member vulcanised with a radical-generating agent and a thermoplastic resin having at least 2 atoms on average and selected from a hydrogen and a sulphur per molecule with an S coefficient of not less than 0,006. The S coefficient is calculated using equation (1) as defined in claim 1, which in turn requires determining the values of the parameters E_C , $C_{HOMO,n}$, $E_{HOMO,n}$, $C_{LUMO,n}$ and $E_{LUMO,n}$.

- 1.2 According to claim 1 as granted "... each of E_c , $C_{HOMO,n}$, $E_{HOMO,n}$, $C_{LUMO,n}$ and $E_{LUMO,n}$ represents a value calculated by a semi-empirical molecular orbital method MOPACPM3 ...".
- 1.3 By contrast, in claim 1 of the main request this feature has been amended by **deleting** the requirement to calculate the value of E_c with the method MOPAC PM3, and by indicating (instead) that the value of E_c is "-8eV for an organic peroxide".
- 1.4 For the opposition division this amendment complied with the requirements of Article 123(3) EPC, because the patent referred explicitly (par. [0028]) to a specific E_c value of -8eV for organic peroxides, and there was no indication that the E_c of these substances could take any other value. There was thus no proof that substituting the calculation of E_c using the MOPAC PM3 model with the specific value of -8eV for organic peroxides extended the scope of protection beyond that of the claims as granted.
- 1.5 The proprietor argued that claim 1 at issue had been restricted with respect to claim 1 as granted because it further defined the nature of the resin member and of the radical generating agent as well as a specific value for the parameter E_c . It was furthermore clear from the wording of par. [0028] of the patent that the use of predetermined values of E_c was not a distinct alternative but represented a specific instance of the calculations with MOPAC PM3, in particular because the two options were connected with the conjunction "and" (i.e. not with an "or"). Additionally, the explicit indication in this passage that the value of E_c could be predetermined as -8eV for organic peroxides "for convenience" implied that this option did not

change the scope in any meaningful way with respect to the alternative of calculating the E_c values with the MOPAC PM3 model. Consequently, the scope of protection of the claims as granted had been restricted and not broadened.

Moreover even if it were assumed that the amendments shifted the subject-matter of claim 1, this would not lead to an extension of the scope of protection of the granted claims, because the values of E_c did not vary significantly even when different groups of radical generating species were considered (e.g. -5eV for an azo compound and -6 eV for a sulfur-containing organic compound as disclosed in par. [0028] of the patent). This argument was reinforced by the examples in E12 ("Number of Repeating Units and Position of Active Atoms" filed by the proprietor on 4 May 2017), in which the S values of the hydrogens in the terminal amino groups of the polyamides were significantly higher than 0.006, implying that small changes in E_c would not suffice to reduce the S value to a point falling outside the scope of protection (i.e. under 0.006).

In any case, the opponent had not submitted any evidence that the amendments extended the scope beyond that of the claims as granted. The cited decision T 0307/05 did not apply, because it required a reasonable doubt that the scope of the claim had changed, and in the absence of evidence in this respect, there was no reasonable doubt but simply speculative arguments. The opponent, who carries the burden of proof, should have made calculations to demonstrate that a problem under Article 123(3) EPC indeed existed, particularly considering that, as argued above, par. [0028] of the patent and E12 provided strong hints that the scope of protection had

not changed in any meaningful way. The opponent's objection was therefore based on an hypothetical possibility that the scope might have been extended, which, following the standards applied to the assessment of novelty, did not suffice to conclude that Article 123(3) EPC had been infringed.

1.6 The board does not agree with this argumentation because the patent explicitly indicates (par. [0028]) that the E_c value can be estimated in one of the following ways:

- i) performing calculations for each particular radical-generating agent with a semi-empirical model known as MOPAC PM3, and
- ii) using (for convenience) a predetermined single E_c value for all substances falling within each group of radical generating species (i.e. organic peroxides, azo compounds or sulfur-containing organic compounds).

In this respect it is to be noted that the MOPAC PM3 model is a semi-empirical simulation method which performs calculations based on the chemical structure of the species, and the group of "organic peroxides" defined in claim 1 at issue encompasses all organic substances including a peroxide group, which implies that the species included therein could have a broad variety of chemical structures. It is therefore clear that the E_c values calculated with the MOPAC PM3 model will vary for the different organic peroxides.

By contrast, the predetermined E_c value of -8 eV for organic peroxides defined in claim 1 at issue represents an approximation for the generic type of organic peroxides which is used "for convenience" in order to avoid having to perform calculations for each specific organic peroxide.

Contrary to the proprietor's argumentation, the definition of a single predetermined E_c value does not restrict the scope of protection with respect to the calculation of a range of E_c values with the MOPAC PM3 model, because this parameter is not used to directly delimit the subject-matter of the invention but only to calculate the value of parameter S, which in turn is compared to the reference of 0.006 to decide whether the hydrogens of a given substance fall within or outside the concept of "active hydrogen" as defined in claim 1. In other words, whether E_c takes a range of values or a single value for the organic peroxides does not necessarily narrow or broaden the scope of protection, but simply gives rise to different calculated S values, which in turn implies that some pairs of polyamide/organic peroxide falling outside claim 1 as granted might fall within claim 1 at issue (or the other way around).

Consequently, the alternative methods in par. [0028] of the patent (i.e. points i) and ii) above) cannot be considered as convergent or redundant options, but necessarily represent two distinct and independent alternatives to estimate E_c . Therefore, the amendment involving the substitution of one method with the other gives rise to a shift of the subject-matter of the invention with respect to the claims as granted.

- 1.6.1 The board agrees with the proprietor in that no specific evidence has been presented to demonstrate that the above mentioned shift in the scope of claim 1 necessarily leads to a problem under Article 123(3) EPC, in particular, no calculations have been performed showing specific polyamide/organic peroxide combinations falling outside the scope of claim 1 as granted but within the scope of claim 1 at issue. In

fact, neither the patent nor any of the subsequent submissions includes an example in which E_c is calculated using the MOPAC PM3 model.

However, contrary to the proprietor's argumentation, in the present context it is not the opponent but the proprietor who carries the burden of proof to show that the amendments are allowable (see Case Law Book 9th ed., II.E.5). In fact, even if, as proposed by the proprietor, the standards used to assess novelty were to be applied, the burden would still be on him, because the amendment at issue involves changes in calculations relating to an unusual and obscure parameter (see T 1764/06 and T 1920/09), which further highlights the responsibility of the proprietor to clear out any possible doubt concerning the extension of the scope of protection under Article 123(3) EPC.

- 1.6.2 The proprietor's arguments based on par. [0028] and the examples in E12 are also not convincing, because even if we knew the range of values obtained when E_c is calculated with the MOPAC PM3 model (which is not the case), it would still be impossible to predict how the S value is affected by the changes in the E_c value without first knowing the values of the other parameters in equation (1) of claim 1. For instance, since E_c is part of the denominators in the two factors of equation 1 of claim 1, if the numerical difference between E_c and $E_{HOMO,n}$ and/or E_c and $E_{LUMO,n}$ were small, even minor changes in E_c could lead to large effects on the value of S. It is also irrelevant that the products in E12 have hydrogens with S values significantly higher than the reference of 0.006 so that the products falling within claim 1 as granted would (allegedly) still fall within the scope of protection of claim 1 at issue, because, on the one hand, claim 1 is not

restricted to these substances, and, on the other, the problems under Article 123(3) EPC result from products falling outside the scope of claim 1 as granted but inside amended claim 1 (i.e. opposite to the proprietor's example).

1.6.3 Contrary to the arguments of the proprietor, the board considers that T 0307/05 (in particular the reasons 3.3 and 3.4) clearly applies to the present case, because not only are there reasonable doubts that the claimed subject-matter has changed, but, as pointed out by the opponent, there is certainty that the calculation of the parameters defined in claim 1 as granted has been modified. As indicated in 3.3.1 of T 0307/05 (see also 3.1 of T 2285/09, and 3.1 of T 0370/10), when assessing compliance with Article 123(3) EPC the boards normally apply the standard of "beyond reasonable doubt" and "the slightest doubt that the scope of the patent as amended could cover embodiments not covered by the unamended patent would preclude the allowability of the amendment". Thus, in the absence of evidence clarifying the implications of the amendment of the method to estimate E_c and considering that, as explained above, it is the proprietor who carries the burden of proof, the opponent should be given the benefit of doubt. This implies that the amendment of the method to calculate E_c in claim 1 at issue is considered to extend the scope of protection of the patent as granted.

1.6.4 The requirements of Article 123(3) EPC are therefore not fulfilled.

1.7 As an addendum, the board notes that, as pointed out during the oral proceedings, claim 1 at issue does not even define that the E_c of the radical-generating agent is -8eV , but rather that E_c is -8eV "for an organic

oxide". Claim 1 at issue is however not restricted to a radical-generating agent consisting of an organic peroxide, but (instead) defines "*an unvulcanized rubber comprising an organic peroxide*" (emphasis added by the board), a wording which encompasses the presence of other radical-generating substances. This alternative is also contemplated in the last sentence of par.

[0075] of the patent, reading: "*the radical-generating agent can be used singly or in combination*". Since claim 1 at issue was amended to remove the requirement to calculate the parameter E_c with MOPAC PM3 and no other method or estimation is defined in the claim for radical-generating substances different from organic peroxides, the E_c for such substances could be any value obtainable with any known theoretical, empirical or semi-empirical method, which further reinforces the argument that the scope of protection has been shifted with respect to the claims as granted.

2. Auxiliary requests 1 to 29 - Article 123(3) EPC

Since claim 1 of all these requests involves the above contested amendment of the method to calculate the value of E_c , the same arguments and conclusion presented for the main request apply to these requests.

Consequently, auxiliary requests 1 to 29 do not fulfill the requirements of Article 123(3) EPC.

3. Auxiliary requests 30 to 33 - Admittance

3.1 These requests having been filed after notification of the summons to attend oral proceedings, their admittance is governed by Article 13(2) RPBA 2020.

3.2 When asked which exceptional circumstances would justify the filing of the requests at such late stage of the proceedings, the proprietor argued that the requests had been filed in response to the preliminary opinion of the board. Prior to this opinion, the opposition division had always considered that the objections under Article 123(3) EPC were not justified, so the requests could not be regarded as late filed. Even though the opponent had presented an objection under Article 123(3) EPC, the preliminary opinion of the board had been the first time in which this objection had been presented in such great detail. Furthermore, the proprietor could not have been expected to file requests addressing all objections presented by the opponent, particularly considering that the large number of objections would have led to a unduly large number of requests.

3.3 The board is not convinced by these reasons, because the objection under Article 123(3) EPC was already present in the first instance proceedings and reiterated in the statement of grounds of appeal. It was therefore the duty of the proprietor to respond to this objection with its reply to the statement of grounds, which is supposed to contain its "complete case" (Article 12(2) RPBA 2007). Furthermore, the wording of Article 13(2) RPBA 2020 clearly establishes that the notification of the summons to oral proceedings represents an important deadline, beyond which amendments of the case should normally not be admitted. It is thus apparent that the opinion presented in the annex to these summons should not be regarded as an exceptional circumstance, unless such opinion brings up entirely new facts which might justify a corresponding reaction by the parties. Furthermore, since the purpose of the appeal

proceedings is precisely to review the decision of the first instance, conclusions and opinions diverging from this decision are anything but exceptional.

The board therefore sees no exceptional circumstance which would justify the late filing of auxiliary requests 30 to 33, and thus concludes that these requests should not be admitted under Article 13(2) RPBA 2020.

4. Auxiliary requests 1b to 33b - Admittance

4.1 These requests were filed shortly before the oral proceedings in response to a new objection by the opponent concerning the clarity of claim 7 of all requests. Besides the amendment to claim 7 to overcome the new clarity objection, the subject-matter of these requests is identical to that of auxiliary requests 1 to 33. The admittance of these requests is also governed by Article 13(2) RPBA 2020, whereby the board may also rely on the criteria in Article 13(1) RPBA 2020.

4.2 Since claim 1 of auxiliary requests 1b to 29b is identical to that of auxiliary requests 1 to 29, it follows that these requests are *prima facie* unsuitable to overcome the objection under Article 123(3) EPC. The board therefore does not admit them into the proceedings under Article 13(2) RPBA 2020, relying on the criteria in Article 13(1) RPBA.

4.3 As to auxiliary requests 30b to 33b, the board notes that while the amendment to claim 7 might have been justified as a reaction to the late filed clarity objection, the other claims of these requests are identical to those of auxiliary requests 30 to 33, so

the same argumentation and conclusions presented for auxiliary requests 30 to 33 apply mutatis mutandis. These requests are therefore not admitted under Article 13(2) RPBA 2020, because there are no exceptional circumstances justifying the late reaction to the objections under Article 123(3) EPC against claim 1.

5. Since none of the requests filed by the patentee is considered to fulfill the requirements of the EPC, there is no basis for maintaining the patent in any form.

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:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated