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Datasheet for the decision of 15 October 2021

Case Number: T 0090/19 - 3.3.03

Application Number: 07875149.2

Publication Number: 2115064

IPC: C08K9/06

Language of the proceedings: EN

Title of invention:
THERMOPLASTIC POLYCARBONATE COMPOSITIONS

Patent Proprietor:
SABIC Global Technologies B.V.

Opponent:
Covestro Deutschland AG

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13(2)

Keyword:
Inventive step - synergy (no)
Inventive step - (no)
Amendment after summons - exceptional circumstances (no)
Late-filed request - admitted (no)

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Case Number: T 0090/19 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 15 October 2021

Appellant: (Opponent)	Covestro Deutschland AG Kaiser-Wilhelm-Allee 60 51373 Leverkusen (DE)
Representative:	Levpat c/o Covestro AG Gebäude 4825 51365 Leverkusen (DE)
Respondent: (Patent Proprietor)	SABIC Global Technologies B.V. Plasticslaan 1 4612 PX Bergen op Zoom (NL)
Representative:	Modiano, Micaela Nadia Modiano Josif Pisanty & Staub Ltd Thierschstrasse 11 80538 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 6 November 2018 rejecting the opposition filed against European patent No. 2115064 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	M. Barrère
	C. Brandt

Summary of Facts and Submissions

I. The appeal of the opponent lies against the decision of the opposition division posted on 6 November 2018 rejecting the opposition against European Patent number 2 115 064.

II. Granted claim 1 read as follows:

"*1. A thermoplastic resin composition comprising:*

from 30 to 89.5 wt.% of an aromatic polycarbonate, wherein the weight average molecular weight of the polycarbonate is at least 46,000 g/mol based on polystyrene calibration standards;

from 0.5 to 20 wt.% of an impact modifier;

from 0 to 25 wt.% of an aromatic vinyl copolymer;

from 6 to 35 wt.% of mineral filler;

an acid or acid salt; and

from 4 to 20 wt.% of a titanium dioxide, wherein the titanium dioxide is coated with silicone or siloxane,

based on the total weight of the composition."

The other granted claims are not relevant to this decision.

III. A notice of opposition had been filed against the patent, requesting the revocation of the patent in its entirety.

IV. The following documents were *inter alia* cited in the opposition division's decision:

D3: WO 2007/001330 A1
D4: JP 2003-096290 A
D15: Data sheets of Kronos® 2230 and Kronos® 2233

V. In the contested decision the opposition division held, among others, that:

- Granted claim 1 involved an inventive step over D3 as the closest prior art. Specifically claim 1 differed from D3 in that the composition comprised 4 to 20 wt% of TiO_2 coated with silicone or siloxane. Furthermore, as evidenced by the experimental part of the patent in suit, the problem solved was the provision of a material with an increased tensile modulus. Since there was no indication in the prior art towards the solution claimed, an inventive step was acknowledged.

Since none of the grounds of opposition prejudiced the maintenance of the opposed patent, the opposition was rejected.

VI. With the statement setting out the grounds of appeal the opponent (appellant) requested that the decision under appeal be set aside and that the patent be revoked.

The appellant contested *inter alia* the finding of the opposition division on inventive step. The objection of

lack of inventive step was based on D3 as the closest prior art. Initially two lines of attack were put forward. In the first line it was held that granted claim 1 differed from D3 in that TiO_2 was coated with silicone or siloxane. In the second line, the appellant considered the distinguishing feature identified in the decision under appeal.

The following additional evidence was filed with the statement of grounds of appeal:

D17: G. H. Michler, "Kunststoff-Mikromechanik: Morphologie, Deformations- und Bruchmechanismen", Hanser, 1992

D18: H. Domininghaus, "Die Kunststoffe und ihre Eigenschaften", 6. Neubearbeitete und erweiterte Auflage, Springer Verlag Berlin Heidelberg, 2005

D19: Calculation of the error resulting from the determination of the E-modulus according to DIN 527

D20: DIN EN ISO 527-1 :1996

VII. With the rejoinder to the statement of grounds, the patent proprietor (respondent) requested dismissal of the appeal and maintenance of the patent as granted. In the alternative maintenance of the patent in amended form on the basis of one of auxiliary requests 1-3 filed therewith was requested.

Auxiliary request 1 included an amendment indicated by the respondent to be related to an added matter issue, which amendment is not relevant to this decision.

In auxiliary request 2 claim 1 was amended with respect to granted claim 1 by specifying that the mineral filler is "talc".

Auxiliary request 3 included the amendments of auxiliary requests 1 and 2.

The following additional evidence was filed with the rejoinder:

D16a: table compiling selected data of D14 and of tables 4 and 5 of the patent in suit

D16b: table compiling selected data of table 2 of the patent in suit

VIII. By letter of 29 January 2021 the parties were summoned to oral proceedings to be held on 15 October 2021.

IX. The Board specified issues to be discussed at the oral proceedings in a communication dated 27 May 2021 containing the preliminary opinion of the Board.

X. By letter of 24 August 2021 the respondent provided *inter alia* further arguments in support of an inventive step. The following additional documents were filed therewith:

D21: EP 1155086 B1
D22: R. Dray, table with melt density of resins

D21 and D22 were indicated by the respondent to be related to an added matter issue.

XI. Oral proceedings were held before the Board on 15 October 2021 by video conference.

As to the inventive step attack the appellant maintained only the objection with the distinguishing feature identified in the decision under appeal. In this context there was no dispute between the parties that examples 7-9 of D3 could be chosen as a starting point for the assessment of inventive step and that the distinguishing feature was the presence of 4 to 20 wt.% of a titanium dioxide, wherein the titanium dioxide is coated with silicone or siloxane (coated TiO_2).

During the oral proceedings and after the Board had announced that claim 1 as granted and claim 1 of auxiliary requests 1-3 did not involve an inventive step, the respondent submitted a new auxiliary request 4.

Claim 1 of auxiliary request 4 corresponded to granted claim 8 and read as follows:

"*1. A thermoplastic composition consisting of:*

from 50 to 85 wt.% of an aromatic polycarbonate,wherein the weight average molecular weight of the polycarbonate is at least 46,000 g/mol based on polystyrene calibration standards;

from 1 to 20 wt.% of an impact modifier;

from 2 to 25 wt.% of an aromatic vinyl copolymer;

from 8 to 25 wt.% of talc;

from 0.01 to 5 wt.% of an acid or acid salt;

4 to 20 wt.% of a titanium dioxide, wherein the titanium dioxide is coated with silicone or siloxane; and

from 0.01 to 7 wt.% of additives, wherein the additives comprise a filler, an antidrip agent, a heat stabilizer, a light stabilizer, an antioxidant, a plasticizer, an antistat agent, a mold release agent, a UV absorber, a lubricant, a pigment, a dye, a colorant, or combinations of two or more of the foregoing,

based on the total weight of the composition."

XII. The appellant's arguments, insofar as relevant to the decision, may be summarised as follows:

(a) Main request (patent as granted)

(i) Inventive step

The closest prior art was represented by examples 7-9 of D3. Granted claim 1 differed from these embodiments in that the composition comprised:

4 to 20 wt.% of a titanium dioxide, wherein the titanium dioxide was coated with silicone or siloxane.

The only effect shown in the examples of the opposed patent was an increase of the E-modulus (stiffness). However, the experimental data were not sufficient to justify any synergistic effect. Thus the objective problem to be solved was the provision of a polycarbonate composition with improved E-modulus.

It was common general knowledge to use a filler in order to increase the tensile modulus of polymeric compositions. D3 itself suggested the addition of a further filler such as TiO_2, provided that it did not degrade the composition. Furthermore, it was known from D4 or D15 that siloxane coated TiO2 could be used in polycarbonate compositions because it minimised the polycarbonate degradation.

The subject-matter of granted claim 1 was therefore obvious in view of D3 in combination with D4 or D15.

(b) Auxiliary requests 1-3

(i) Inventive step

The above arguments applied *mutatis mutandis* to auxiliary requests 1-3. In particular, the specification that the filler was talc did not constitute a further distinguishing feature.

(c) Auxiliary request 4

(i) Admittance

The amendments of claim 1 were not suitable to overcome the objection of lack of inventive step. Furthermore the admittance of auxiliary request 4 would be detrimental to the economy of procedure.

Auxiliary request 4 should therefore not be admitted to the proceedings.

XIII. The respondent's arguments, insofar as relevant to the decision, may be summarised as follows:

(a) Main request (patent as granted)

(i) Inventive step

The closest prior art was represented by examples 7-9 of D3. Granted claim 1 differed from these embodiments in that the composition comprised:

> 4 to 20 wt.% of a titanium dioxide, wherein the titanium dioxide was coated with silicone or siloxane.

It was shown in the examples of the opposed patent that the combination of talc with a coated TiO_2 led to an increase in tensile modulus beyond the sum of the effects of each filler taken individually (synergistic effect). Furthermore, the results reported in table 5 of the opposed patent provided evidence that the impact strength at 23°C could be maintained. Therefore, the objective problem to be solved was the provision of a polycarbonate composition with an improved E-modulus (stiffness) while maintaining a reasonable impact strength at 23°C.

None of the available prior art documents suggested that the claimed combination of a mineral filler with the coated TiO_2 had a synergistic positive effect on the E-modulus. In fact, in D3 it was not even suggested to use two fillers, one of which being TiO_2.

The subject-matter of granted claim 1 was therefore inventive over D3.

(b) Auxiliary requests 1-3

(i) Inventive step

The above arguments applied *mutatis mutandis* to auxiliary 1.

In auxiliary requests 2 and 3, claim 1 was further amended with respect to granted claim 1 by specifying that the mineral filler was "talc". There was no pointer in the prior art suggesting the combination of talc and the coated TiO_2. The subject-matter of claim 1 of auxiliary requests 2 and 3 was therefore inventive over D3.

(c) Auxiliary request 4

(i) Admittance

The unexpected discussion about the interpretation of the examples of the opposed patent prompted the respondent to file auxiliary request 4. In reply to the criticism that the total content of mineral fillers could be high, new claim 1 was now limited to a maximum of 25 wt.% of talc. Furthermore, new claim 1 corresponded to granted claim 8 and could therefore not be considered a complex and surprising amendment.

Auxiliary request 4 should therefore be admitted to the proceedings.

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

XV. The respondent requested that the appeal be dismissed, or, alternatively that the patent be maintained in amended form on the basis of one of auxiliary requests 1 to 3 filed with the rejoinder to the statement of

grounds of appeal, or on the basis of auxiliary request 4 filed during the oral proceedings on 15 October 2021.

Reasons for the Decision

1. Main request (patent as granted)

1.1 Inventive step

1.1.1 Closest prior art

D3 pertains as the patent in suit to filled thermoplastic polycarbonate compositions having improved mechanical properties (see D3, page 1, first paragraph; patent in suit, paragraph [0001]).Therefore, the Board agrees with the parties and the opposition division that D3 can be selected as the closest prior art for the subject-matter of claim 1.

1.1.2 Technical differences

It is not disputed between the parties that example 7 of D3 is a suitable starting point towards the invention.

The Board does not see any reason to depart from that view.

Example 7 of D3 (see table 3 with back reference to table 1) discloses a thermoplastic resin composition comprising:

77,01 wt.% of a bisphenol A based polycarbonate (PC-2) corresponding to an aromatic polycarbonate resin according to claim 1;

4,4 wt.% of core-shell particles MBS 1 (with a butadiene core and styrene-methyl methacrylate shell) corresponding to an impact modifier according to claim 1;

9,5 wt.% of a styrene acrylonitrile copolymer SAN corresponding to an aromatic vinyl copolymer according to claim 1;

8 wt.% of talc (filler 1) corresponding to a mineral filler according to claim 1; and

phosphorous acid (acid 1) corresponding to an acid according to claim 1

based on the total weight of the composition.

In agreement with the parties (there was no dispute that the condition on the weight average molecular weight of the polycarbonate was met), the Board holds that claim 1 differs from example 7 in that the composition further comprises:

4 to 20 wt.% of a titanium dioxide, wherein the titanium dioxide is coated with silicone or siloxane.

1.1.3 Objective technical problem

According to the respondent the objective problem to be solved over D3 may be seen as the provision of a polycarbonate composition having an improved E-modulus (or stiffness) while maintaining a reasonable impact strength at 23°C.

The Board agrees with the parties that the E-modulus of the polycarbonate compositions is increased by the addition of coated TiO_2. However, contrary to the respondent's view, the Board cannot recognise any positive effect on the impact strength. As shown in table 5 of the opposed patent (see examples 6-8 vs. examples 2-4), the addition of 4 wt.% of a coated TiO_2 results in a reduction of the impact strength at 23 °C and not in a retention thereof. In this respect the addition of coated TiO_2, similar to the addition of talc as a filler, results in an increase in one property and a decrease in the other (although to a lesser extent) with no clear advantage in maintenance of the latter property.

The respondent further argued that a comparison between examples 2, 5 and 6 or between 2, 9 and 10 or between 3, 5 and 7 shows that, upon adding the combination of the mineral filler talc and the coated TiO_2, the increase in tensile modulus is greater than may be expected based on the separate addition of either the mineral filler talc or the coated TiO_2 (see opposed patent, table 5 and D16a which compiles selected data of the opposed patent). Consequently an unpredictable synergistic effect between the coated TiO_2 and the mineral filler talc would occur. The respondent further pointed out that the degree of error associated with the method to measure the tensile modulus (±3,5%) was a maximum.

The Board cannot follow this line of arguments. Contrary to the respondent's view, the effect of the combination talc and 4 wt% of coated TiO_2 is not sufficient to justify any synergistic effect. In particular the difference between the moduli of examples 1 and 5 (in the absence of talc) is 98 while

the difference between the moduli of examples 2 and 6 (in the presence of talc) is 145. Thus the alleged positive effect of 4 wt% of coated TiO_2 in the presence of talc (145-98 = +47 units representing 1,5% of the modulus of 3192 in example 6) does not go beyond the margin of error of the measurement (estimated by the appellant to be at most ±3,5% which was not contested by the respondent). Furthermore, even if the positive effect in the presence of 8 wt% of 16 wt% of coated TiO_2 goes beyond the error margin of the measurement method, it is not of a magnitude which justifies the acknowledgement of a synergistic effect. In any case, even if a synergistic effect were to be acknowledged for a content of coated TiO_2 of at least 8 wt% (which is contested by the Board), it would not be sufficient to consider that said effect would be obtained over the whole scope of claim 1 (since a content of 4 wt% of coated TiO_2 does not lead to said effect).

For these reasons, the objective problem to be solved over D3 is the provision of a polycarbonate composition having an improved E-modulus (or stiffness).

1.1.4 Obviousness of the solution

The respondent held that none of the available prior art documents suggests to add a coated TiO_2 in order to solve the above problem. In particular the effect of TiO_2 on the stiffness could not be foreseen. Furthermore D3 would teach to use TiO_2 as a UV absorber or pigment (see D3, pages 34-35, bridging paragraph and page 36, last paragraph) but not as an additional filler.

The Board cannot follow this conclusion for the following reasons:

First the teaching of D3 itself has to be considered. According to D3 (see page 1, third paragraph) a "known method of increasing stiffness in polycarbonates is with the addition of mineral fillers, such as talc and mica". This is further confirmed by the textbooks D17 and D18:

> "*Der Einfluß einer Füllung mit anorganischen Partikeln auf das mechanische Verhalten von Thermoplasten entspricht oft dem in Abbildung 10.4. gezeigten Verhalten. Vorteilhaft ist die Vergrößerung der Steifigkeit bzw. des Elastizitätsmoduls.*" (see D17, page 323, paragraph 10.2.1)
> Translation by the Board: The influence of a filler with inorganic particles on the mechanical behavior of thermoplastics often corresponds to the behavior shown in Figure 10.4. The increase in stiffness or modulus of elasticity is advantageous.

> "*Die Füllstoffe erhöhen Dichte, E-Modul, Druck- und Biegefestigkeit, Härte, Formbeständigkeit in der Wärme, Oberflächengüte und - je nach Füllstoffsorte - das antistatische Verhalten oder die Brandschutzwirkung.*" (see D18, page 177, last paragraph)
> Translation by the Board: The fillers increase density, E-modulus, compressive and flexural strength, hardness, dimensional stability under heat, surface quality and - depending on the filler grade - anti-static behavior or fire retardancy.

Thus it cannot be disputed that inorganic fillers are used to increase stiffness of the compositions of D3 as confirmed by general common knowledge.

D3 further teaches that:

> "*Combinations of fillers may also be used.*" (see D3, page 21, lines 17-18)

and

> "*Other fillers and/or reinforcing agents may be used if desired, as long as they do not further degrade the composition.*" (see D3, page 22, lines 14-15)

Based on the clear instructions of D3, the Board considers that the addition of any filler that does not further degrade the composition is obvious for a person skilled in the art wishing to increase the stiffness of the composition.

Secondly, TiO_2 is mentioned as an example of a suitable additional filler (see D3, page 22, line 20). While it is true that TiO_2 may also be also used as pigment and UV absorber, the possibility for TiO_2 to have additional functions does not teach away from using this additive as a filler. Furthermore, it is known from D4 and D15 that silicone/siloxane coated TiO_2 is particularly advantageous since it minimises the polymer degradation in polycarbonate compositions (see D4, pages 19-20, bridging paragraph; D15, page 1, properties).

Consequently, in view of the teaching of D3 itself complemented by the one in D4 and D15, it is obvious for the person skilled in the art wishing to increase the stiffness of the compositions of D3, to add thereto a silicone/siloxane coated TiO_2 which does not further degrade the polycarbonate composition.

The Board therefore concludes that claim 1 lacks an inventive step over D3 in combination with D4 or D15.

2. Auxiliary request 1

According to the respondent, auxiliary request 1 does not address the objection of lack of an inventive step.

Consequently the above conclusions (see point 1.1.4) apply *mutatis mutandis* to claim 1 of auxiliary request 1 with the consequence that said claim does not involve an inventive step over D3 in combination with D4 or D15.

3. Auxiliary requests 2 and 3

Claim 1 of auxiliary request 2 differs from granted claim 1 in that the mineral filler is talc.

The respondent filed auxiliary request 2 in order to overcome the objections of the appellant pursuant to Article 56 EPC. Specifically, the respondent argued that there would be no pointer in D3 suggesting the combination of talc and the coated TiO_2.

The Board notes that the use of talc as mineral filler is known from example 7 of D3. It follows from this that the limitation of the mineral fillers to talc does not represent an additional distinguishing feature over D3. The amendments thus does not result in any change of the formulation of the technical problem, nor in the analysis of obviousness. Therefore the Board concludes that claim 1 of auxiliary request 2 lacks an inventive step for the same reasons as outlined for the main request.

The same applies to claim 1 of auxiliary request 3 which combines the amendments of auxiliary requests 1 and 2.

4. Auxiliary request 4

Auxiliary request 4 was filed by the respondent at the oral proceedings after the conclusion of the Board on the previous requests had been announced. Its admittance to the proceedings, which is contested by the appellant, is subject to the stipulations of Article 13(2) RPBA 2020, according to which any amendment to a party's case filed after notification of the summons to oral proceedings shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

According to the respondent, auxiliary request 4 was filed in reaction:

to the unexpected discussion about the interpretation of the examples of the opposed patent and

to the criticism that the total content of mineral fillers would be too high.

The Board notes that the interpretation of the examples was already discussed from the beginning of the appeal proceedings. The same applies to the effect of the filler content (see statement of grounds of appeal, page 11, third and last paragraph). Furthermore, the assessment of the examples made in the above paragraph 1.1.3 is similar to that presented in the Board's preliminary opinion dated 27 May 2021. Consequently the

Board cannot recognise in the respondent's submissions any exceptional circumstance, which would justify the admittance of auxiliary request 4 at the oral proceedings.

Under these circumstances, auxiliary request 4 is not admitted into the proceedings (Article 13(2) RPBA 2020).

5. Since none of the requests of the respondent admitted to the proceedings is allowable, there is no need to deal with any other issue and the patent is to be revoked.

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:

B. ter Heijden D. Semino

Decision electronically authenticated