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**Datasheet for the decision
of 28 February 2025**

Case Number: T 0910/23 - 3.3.03

Application Number: 17751064.1

Publication Number: 3494163

IPC: C08G65/40, C08L71/00, C08J5/12,
C08K5/42, C09J171/00

Language of the proceedings: EN

Title of invention:

POLY(ARYL ETHER KETONE) (PAEK) COMPOSITIONS INCLUDING A LOW
MOLECULAR WEIGHT AROMATIC COMPOUND

Patent Proprietor:

Solvay Specialty Polymers USA, LLC

Relevant legal provisions:

EPC Art. 113(1), 111(1)
EPC R. 111(2), 103(1)(a)
RPBA Art. 11, 12(2)

Keyword:

Appealed decision sufficiently reasoned (no)
Substantial procedural violation - (yes)
Reimbursement of appeal fee (yes)
Remittal (yes)



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Case Number: T 0910/23 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 28 February 2025

Appellant: ARKEMA FRANCE
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Respondent: Solvay Specialty Polymers USA, LLC
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 20 March 2023
rejecting the opposition filed against European
patent No. 3494163 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman D. Semino
Members: F. Rousseau
A. Bacchin

Summary of Facts and Submissions

I. The appeal by the opponent lies against the decision by the opposition division rejecting the opposition against European patent No. 3 494 163.

II. The following documentary evidence was among others submitted before the opposition division:

D6: ARKEMA analysis bulletin of 14 February 2011, reference DARC 2010-0571

D10: Smithers laboratory report dated 6 July 2021

D11: "New Polyarylketone Polymer for Use in the Manufacturing of Test Sockets: OXPEKK®", BITS 2010, Poster Session

D12: WO 2014/013202 A1

D15: WO 2015/189567 A1

D16: EP 3 012 297 A1

D17: WO 2016/092087 A1

D18: Emilie Cossoul *et al.*, "Evaluation of atmospheric solid analysis probe ionization coupled to ion mobility mass spectrometry for characterization of poly(ether ether ketone) polymers", *Analytica Chimica Acta* 856, 2015, pages 46-53

D19: Alain Jonas and Roger Legras, "PEEK Oligomers: A Model for the Polymer Physical Behavior. 3. Nature of Oligomers in the PEEK Polymer", *Macromolecules* 1993, 26, pages 2674-2678

D20: EP 2 208 748 A1

D21: JP-2010-095613 A and machine translation thereof
D21a

D22: S. Ishiguro *et al.*, "High-Performance and High Speed Gel Permeation Chromatography Using Polar Solvents", GPC Symposium, 1-4 October 1989

D37: Material Safety Data Sheet, PEKK Pellets, Arkema, Product code: HES1067, 2011.

- III. According to the reasons for the contested decision which are pertinent in the appeal proceedings:
- (a) The subject-matter of claims 1, 2 and 10 to 15 met the requirements of sufficiency of disclosure.
 - (b) Novelty over each of the commercial products OXPEKK C, OXPEKK CE, Kepstan 8002, 7002 and 8001 and documents D11 and D37 was acknowledged.
 - (c) An inventive step was recognized starting from the disclosure of each of D15 and D17 as the closest prior art.
 - (d) On this basis, the opposition was rejected.
- IV. An appeal was filed by the opponent (appellant) and written submissions were made by both that appealing party and the patent proprietor (respondent).
- V. In preparation of the oral proceedings, a communication pursuant to Article 15(1) RPBA conveying the Board's provisional opinion was issued.
- VI. On 28 February 2025, oral proceedings before the Board were conducted by means of videoconference.
- VII. The final requests of the parties were as follows:
- 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, i.e. that the patent be maintained as granted (main request), or alternatively that the contested decision be set aside and that the patent be maintained on the basis of any of auxiliary requests AR1 to AR10, all filed with the reply to the statement of grounds of appeal.

VIII. The claims of the patent as granted which are relevant to the present decision are as follows:

"1. A polymer composition comprising :

- (a) a poly(aryl ether ketone) (PAEK) component including:

(a1) a poly(aryl ether ketone) (PAEK) having a melting temperature (T_m), a crystallization temperature (T_c), and a glass transition temperature (T_g) satisfying the relationship:

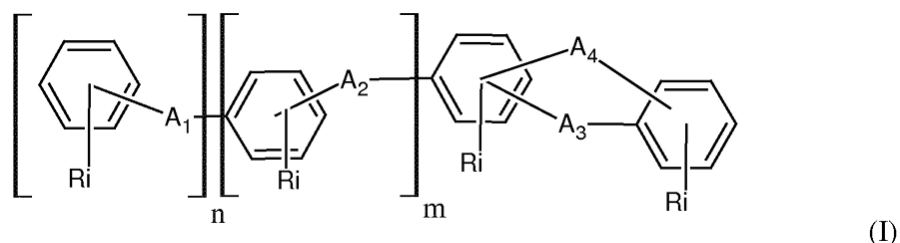
$$(T_m - T_c) / (T_m - T_g) \geq 0.31,$$

wherein the melting temperature (T_m), crystallization temperature (T_c), and glass transition temperature (T_g) are determined by differential scanning calorimetry according to ASTM D3418 employing a heating and cooling rate of 20°C/min; or

(a2) an amorphous poly(aryl ether ketone) (PAEK) and a semi-crystalline poly(aryl ether ketone) (PAEK),

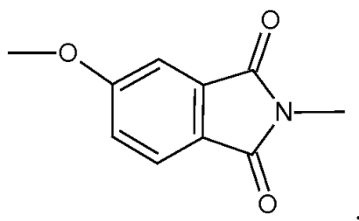
- (b) from 0.5 wt. % to 5 wt. %, preferably from 1 wt. % to 3 wt. %, relative to the weight of the polymer

composition, of at least one low molecular weight aromatic compound of formula (I):



wherein :

each of A_1 , A_3 and A_4 is independently selected from the group consisting of a bond, a sulfone group $[-S(=O)_2-]$, a ketone group $[-C(=O)-]$, an ether $[-O-]$, and a group $-C(R^5)(R^6)-$, provided that A_4 is optional, each A_2 is independently selected from the group consisting of a bond, a sulfone group $[-S(=O)_2-]$, a ketone group $[-C(=O)-]$, an ether $[-O-]$, a group $-C(R^5)(R^6)-$, and a group:



each R^5 and R^6 is independently selected from the group consisting of a hydrogen, a halogen, an optionally-halogenated alkyl, an alkenyl, an alkynyl, a phenyl, an ether, a thioether, a carboxylic acid, an ester, an amide, an imide, an alkali or alkaline earth metal sulfonate, an alkyl sulfonate, an alkali or alkaline earth metal phosphonate, an alkyl phosphonate, a $-CF_3$ group, an amine, and a quaternary ammonium;
 n is an integer selected from 0 and 1;
 m is an integer ranging from 0 to 32;

each R is independently selected at each occasion from the group consisting of a halogen, an alkyl, an alkenyl, an alkynyl, an aryl, an ether, a thioether, a carboxylic acid, an ester, an amide, an imide, an alkali or alkaline earth metal sulfonate, an alkyl sulfonate, an alkali or alkaline earth metal phosphonate, an alkyl phosphonate, an amine, and a quaternary ammonium; and

each i is an independently selected integer at each occasion ranging from 0 to 5; and

- (c) optionally a reinforcing filler, preferably a glass fiber;

further wherein the polymer composition exhibits a heat of fusion of at least 8 J/g, preferably at least 16 J/g.

8. A polymer-metal junction comprising the polymer composition of any one of claims 1 to 7 in contact with a metal surface, preferably a structured metal surface.

9. The polymer-metal junction of claim 8, wherein the metal surface comprises aluminum.

10. The polymer-metal junction of any one of claims 8 and 9, wherein the polymer-metal junction exhibits a lap shear strength ≥ 15 MPa, preferably ≥ 20 MPa, when measured according to ASTM D1002.

12. A method of making a polymer-metal junction comprising contacting a metal surface with the polymer composition of any one of claims 1 to 7.

13. The method of claim 12, wherein contacting the metal surface with the polymer composition comprises injection molding the polymer composition in a mold having a temperature ranging from 150 to 185°C.

14. The method of any one of claims 12 and 13, wherein the polymer-metal junction exhibits a lap shear strength ≥ 15 MPa, preferably ≥ 20 MPa, when measured according to ASTM D1002."

IX. The parties' submissions, in so far as they are relevant to the present decision, can be derived from the reasons for the decision set out below. While the parties were in agreement that procedural violations by the opposition division had occurred, they had different opinions as to whether the case should be remitted to the opposition for further prosecution.

Reasons for the Decision

Deficiencies of the contested decisions

1. The main request is the patent as granted which corresponds to the request underlying the contested decision. Before the opposition division, the appellant raised, *inter alia*, objections of lack of sufficiency of disclosure in respect of each of claims 1, 10 and 14, as well as objections of lack of novelty vis-à-vis each of the commercial products OXPEKKC and OXPEKK-CE sold by OPM, Kepstan 7002, 8002 and 8001 and lack of an inventive step starting from the disclosure of the PEEK-PEDEK polymers described in D15 or D17, which objections were pursued on appeal.

2. The appellant's main line of argumentation concerning sufficiency of disclosure of the subject-matter of claim 1 is based on the argument that a poly(aryl ether ketone) polymer (PAEK) produced by a conventional synthesis process, i.e. feature (a) of claim 1, comprises a certain proportion of compounds of formula (I) according to feature (b) of claim 1, whereby the proportion of said compounds of formula (I) in a PAEK polymer cannot be measured (statement of grounds of appeal, objection starting at page 9, section 3.1.1, fourth paragraph, ff and sections 3.1.2 to 3.1.5). The appellant contends, in essence, that the preparation of the composition of operative claim 1 requires measurement of the content of compounds of formula (I) in the PAEK polymer in order to adjust, if necessary, the amount of compounds of formula (I) by addition to the PAEK polymer or removal of such compounds from the polymer, so as to obtain an amount of product of formula (I) within the range of from 0.5 wt.% to 5 wt.%, as defined under feature (b) of claim 1.

The appellant's line of argumentation is therefore based on the premise that the amount of compounds of formula (I) specified under feature (b) would include that contained in the PAEK polymer component (a).

The appellant relies on documents D18, D19, D20, D21, D21a, D22 and D10 in order to demonstrate the presence of compounds of formula (I) in a PAEK polymer and the impossibility of separating them from it, at least as far as the oligomers are concerned (statement of grounds of appeal, passage from page 9, beginning with the fourth paragraph of section 3.1.1 to page 20, section 3.1.6). Corresponding submissions had already been made before the opposition division, reference being made to documents D6, D12, D16 and D18 to D22

(decision, points 11.2 to 11.5; minutes, page 2, point 1; appellant's letter of 14 December 2022, pages 3 to 6, point 2.1 and notice of opposition, pages 9 to 15, point 3.1).

2.1 The opposition division did not find this objection persuasive, the reasons in this respect consisting of four short sections (11.7 to 11.10 on page 4 of the decision). The opposition division essentially held that the objection rather concerned the scope of protection and thus clarity rather than sufficiency of disclosure.

2.1.1 According to section 11.7, claim 1 would "*define a composition comprising a polymer PAEK (a) and from 0.5 wt.% to 5 wt.% of compound (b) defined by formula (I) added therein*" (emphasis added by the Board). This implies a construction of feature (b) of operative claim 1 according to which feature (b) defines a compound of formula (I) which is not part of the poly(aryl ether ketone) (PAEK) defining component (a) of the claimed polymer composition.

This is consistent with the meaning of feature (b) in section 17.19 of the Reasons for the decision concerning the inventive step analysis in which the opposition division starting from PEEK-PEDEK polymers disclosed in D15 or D17 as the closest prior art considered that "*none of the cited documents disclose that adding 0.5 to 5wt.% of compounds (b) would lead to such an effect.*" Although it was assumed that components (b) were present in these PEEK-PEDEK polymers in view of their synthesis (section 17.11 of the Reasons), the whole question of obviousness of the solution did not concern the amount of component (b) already present in these PEEK-PEDEK polymers, but the

addition of compounds (b) thereto (Reasons, sections 17.15 and 17.16 regarding the addition of a particular compound (b) as plasticiser; section 17.17 concerning the addition of component b) in the examples of the patent in suit resulting in an increase in tensile strength as well as an increase in lap shear strength without modifying the heat of fusion).

- 2.1.2 However, a different reading of the feature (b) was made by the opposition division in section 11.10 of the Reasons for decision, also concerning sufficiency of disclosure, where it is stated that "*In addition it has not be proven that the examples in the patent cannot be reproduced. Even though it is argued that the quantitative analysis is difficult, no attempts have been provided*" (emphasis added by the Board).

This indicates that the opposition division agreed with the appellant's position that the amount of compounds of formula (I) defined by feature (b) was not seen to correspond to a further compound added to component (a) of the polymeric composition.

This is consistent with the reasons given in relation to novelty over the commercial products OXPEKKC and OXPEKK-CE sold by OPM (Reasons, sections 15.4 to 15.6). In this regard, it was acknowledged that those products contained an amount of EKKE (a monomeric compound of formula (I)) falling within the range defined with feature (b) (Reasons, section 15.5), but it was decided that novelty of the subject-matter of claim 1 was given over those commercial products, since there was "*no information on file concerning the amount of other compounds (b) in these samples whereas D18 to D22 show that oligomers falling under compound (b) are present in PAEK polymers*" (Reasons, section 15.6). A similar

reasoning was also given with respect to novelty over the commercial products Kepstan 7002, 8002 and 8001 (Reasons, sections 15.10 and 15.11).

- 2.1.3 There is also no explanation, and the Board sees none, as to why incompatible interpretations of the same feature of claim 1 would be justified.
- 2.1.4 In summary, not only did the opposition use two conflicting interpretations of feature (b) in the Reasons for the decision concerning sufficiency of disclosure of the polymer composition of claim 1, but it also used one of these two incompatible interpretations to justify the novelty of the claimed polymer composition, while taking the other to explain the presence of an inventive step. This inherent contradiction implies that the whole reasoning given by the opposition division in respect of the subject-matter of claim 1 lacks the necessary logic for the Board to understand why the grounds of opposition raised against that claim do not prejudice the maintenance of the patent as granted. Moreover, given that only one of those interpretations could be valid in view of their incompatibility, it means also that the decision as to novelty and inventive step of the subject-matter of claim 1 cannot be reviewed by the Board, as it is incomplete.
- 2.1.5 This is particularly relevant to the issues at stake in the appeal proceedings, since the parties have not found common ground on the meaning of said feature (b) of claim 1. Whereas the appellant understands that the amount of compound of formula (I) refers to the amount comprised in the polymer composition (statement of grounds of appeal, in particular page 10, second paragraph, page 28, fifth paragraph, page 43, first to

third paragraphs), the respondent consistently argues that the present patent does not concern the determination of the amount of impurities, but rather the mixing of components in order to obtain a composition as defined in claim 1 of the contested patent (rejoinder, page 10, item 2.9, page 13, item 4.1.3; page 16, item 4.1.8; page 29, item 6.1.6; page 34, item 6.2.3.5 and page 35, item 6.2.4.3). Despite the divergent arguments of the parties as to the meaning of feature (b) of claim 1, the board also notes that the opposition division in its decision did not make a claim construction, which would have provided the basis for the further assessment of the requirements of sufficiency of disclosure, novelty and inventive step.

- 2.2 According to settled case law, the obligation to give reasons under Rule 111(2) EPC, as an expression of the right to be heard enshrined in Article 113(1) EPC, also includes the principle that sufficient reasons are provided, i.e. that the grounds upon which the decision was based and all decisive considerations in respect of the factual and legal aspects of the case must be discussed in detail in the decision (Case Law of the Boards of Appeal of the EPO, 10th edition 2022, hereafter "Case Law", III.K.3.4.3 and III.K.3.4.4 b)). A decision should, as a rule, be complete and self-contained, so that the board does not have to reconstruct or even speculate the possible reasons for it. In particular, a decision should discuss the facts, evidence and arguments which are essential to the decision in detail, and has to contain the logical chain of reasoning which led to the relevant conclusion. The reasons for the decision must enable both the parties and the board of appeal to understand whether or not the decision is justified. (Case Law,

supra, V.A.9.4.4 b)). For the reasons given in points 2.1.1 to 2.1.4 this requirement has not been met in the present case.

In view of the foregoing, the decision in respect of the subject-matter of claim 1 is not reasoned within the meaning of Rule 111(2) EPC. The absence of reasoning, resulting from the intrinsic inconsistency in the decision, was also attributed to the omission of claim construction by the opposition division. It is indeed evident that the ensuing assessment of sufficiency of disclosure, novelty and inventive step is contingent upon a proper construction of the claim under consideration. This insufficient reasoning in the decision is in violation of the appellant's right to be heard foreseen by Article 113(1) EPC and justifies to set aside the decision under appeal and a reimbursement of the appeal fee of the opponent in accordance with Rule 103(1) (a) EPC.

3. Furthermore, additional submissions which form the basis of the appellant's objections concerning an insufficiency of disclosure of the subject-matter of claims 1, 10 and 14, and which the appellant raises again on appeal, were not given due consideration in the contested decision and are also not reasoned within the meaning of Rule 111(2) EPC. Hence the decision is incomplete also in this respect.

3.1 Concerning claim 1, the appellant also argues that formula (I) is so broad that it would cover an immense number of compounds (b), the vast majority of which are unknown in the art and for which the patent does not explain how to synthesise these compounds. Without a known synthesis of these compounds, it would not be possible to prepare them making impossible to carry out

the invention defined in operative claim 1 (statement of grounds of appeal, page 9, point 3.1.1, third paragraph). This line of argumentation was already brought forward in the notice of opposition (page 9, section 3.1, third paragraph) and maintained during the oral proceedings (minutes, page 2, third paragraph of section 1 concerning claim 1). This line of argumentation was not dealt with in the decision.

- 3.2 The appellant also contends that the subject-matter of claims 10 and 14 which require the achievement of a minimum value of 15 MPa for the lap shear strength of a polymer-metal junction, when measured according to norm ASTM D1002, the polymer being the polymer composition of claim 1, is not sufficiently disclosed to be carried out by the person skilled in the art. The appellant submits that the mere reference to the standard ASTM D1002 does not adequately describe the measurement method, as it does not describe the application and bonding conditions used in the preparation of the samples to be tested, but also that the lap shear strength also depends on the nature of both the polymer composition and the metal substrate. In that regard, the appellant refers to a comparison of the comparative examples CE3 and CE3bis, as regards the nature of the metal substrate (statement of grounds of appeal, page 23, first full paragraph).

That objection was also submitted before the opposition division (notice of opposition, page 15, point 3.2, starting at the third paragraph and minutes of the oral proceedings, page 2, penultimate paragraph). The reasons for the decision concerning this objection are to be found in section 11.14 on page 5 which reads "*A result to be achieved and an issue related to a method of measurement concerns clarity which is not a ground*

of opposition. The opposition division thus cannot concur with the opponent that claims 10-14 do not fulfil the requirements of Art. 83 EPC. In addition it has not been proven that this parameter could not be measured for the examples in the patent. Tables 3 to 5 provide this parameter and paragraph [0099] details the method."

The opposition division did not deal with the appellant's argument that the achievement of the lap shear strength defined in claim 1 necessitated a selection of both the metal substrate and the polymer composition. Nor is there any explanation as to why, in the present case, the result to be achieved would rather be a matter of clarity.

- 3.3 These additional fundamental deficiencies concerning the analysis of the sufficiency of disclosure of the subject-matter of claims 1, 10 and 14 are also in contravention of the appellant's right to be heard pursuant to Article 113(1) EPC and render the decision insufficiently reasoned and incomplete. They also justify that the decision under appeal be set aside and the appeal fee be reimbursed in accordance with Rule 103(1) (a) EPC.

Remittal (Article 111(1) EPC, Article 11 RPBA)

4. Under Article 111(1) EPC, it is at the discretion of the Board of Appeal whether it decides on the merits or remits the case to the instance which issued the decision under appeal. Article 11 RPBA stipulates that the Board shall not remit a case to the department whose decision was appealed for further prosecution, unless special reasons present themselves for doing so. As a rule, fundamental deficiencies which are apparent

in the proceedings before that department constitute such special reasons, i.e. the Board will normally remit the case (see explanatory remarks on Article 11 RPBA, Supplementary publication 2, OJ 2020, page 54). Moreover, according to the explanatory remarks, whether "special reasons" present themselves is to be decided on a case-by-case basis. If all issues can be decided without an undue burden, a Board should normally not remit the case.

4.1 While the respondent requested a remittal, the appellant argued that remitting the case would unnecessarily delay the proceedings and that, as all the necessary arguments had been already submitted, a decision could be taken by the Board.

4.2 This is not convincing.

Any remittal will, *ipso facto*, result in a delay of the proceedings. The mere fact that the proceedings will be prolonged cannot therefore take precedence over the normal rule laid down in Article 11 RPBA. Furthermore, the respondent requesting to have the decisive issues be examined first by the opposition division would be deprived of a first instance decision on these issues as a result of the substantial procedural violations, but not as a result of their conduct.

Moreover, having regard to the need to decide for the first time on the meaning to be ascribed to feature (b), the consequent need to assess the question of novelty or inventive step in a different way than in the proceedings before the opposition division, and the absence of any reasoning provided with regard to the question of sufficiency of disclosure mentioned in points 3.1 and 3.2 above, it is immediately evident

that all these issues cannot be decided by the Board without an undue burden. It is also observed that the parties did not provide written submissions as to why one of the meanings of feature (b) should prevail over the other. Had the opposition division taken a clear position on the interpretation of claim 1 and had justified it, the parties would have been able to provide arguments as to its correctness. They would also have been able to formulate a line of arguments on the basis of this interpretation for sufficiency of disclosure, novelty and inventive step.

As an aside, it is noted that where an infringement or revocation action has been instituted before the Unified Patent Court or a national court or competent authority of a contracting state the proceedings before the EPO may be accelerated upon request, which may be done at both the opposition and appeal stages (Article 10(3) to (6) RPBA).

In the light of the foregoing, the Board, after having weighted up all the relevant circumstances of the present case, and taken into consideration that the primary object of the appeal proceedings is to review the decision under appeal in a judicial manner (Article 12(2) RPBA 2020), decided to remit the case to the opposition division for further prosecution.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division for further prosecution.
3. The appeal fee is reimbursed.

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated