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**Datasheet for the decision  
of 24 March 2023**

**Case Number:** T 0999/20 - 3.3.03

**Application Number:** 12732379.8

**Publication Number:** 2661453

**IPC:** C08G64/02

**Language of the proceedings:** EN

**Title of invention:**

POLYMER COMPOSITIONS AND METHODS

**Applicant:**

SAUDI ARAMCO TECHNOLOGIES COMPANY

**Relevant legal provisions:**

EPC Art. 84, 111(1)

RPBA 2020 Art. 11

**Keyword:**

Claims - clarity (yes)

Remittal - (yes)

**Decisions cited:**

T 0541/09, T 0849/11, T 2063/12



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Case Number: T 0999/20 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 24 March 2023**

**Appellant:**  
(Applicant)

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**Decision under appeal:**

**Decision of the Examining Division of the  
European Patent Office posted on 21 November  
2019 refusing European patent application No.  
12732379.8 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** O. Dury  
R. Cramer

## Summary of Facts and Submissions

I. The appeal by the applicant (appellant) lies against the decision of the examining division refusing European patent application No. 12 732 379.8.

II. The following documents were *inter alia* cited in the decision under appeal:

D7: M.D. Lechner et al., Makromolekulare Chemie - Ein Lehrbuch für Chemiker, Physiker, Materialwissenschaftler und Verfahrenstechniker, 3rd Edition, 1 January 2003, ISBN: 978-3-7643-5343-8, page 237

D8: H. Elias: Makromoleküle - Band 1: Chemische Struktur und Synthesen, 6th Edition, 31 December 1999, Wiley VCH, ISBN: 978-3-527-29959-1, pages 75-77

D9: M. Netopilik et al., Number-average molecular weight of branched polymers from SEC with viscosity detection and universal calibration, Polymer International, Vol. 57, no. 10, 1 October 2008, pages 1152-1158

D10: G. Odian, Principles of Polymerization, 3rd Edition, 1991, pages 19-24

D11: M.P. Stevens, Polymer Chemistry - An Introduction, 3rd Edition, 1999,

pages 53-57

A1: Affidavit by C.A. Simoneau, dated  
18 August 2019

- III. In that decision, which was based on a single request filed with letter of 11 July 2018, the examining division held that, in view of the teaching of D8 and D9, the lack of information both in the claims and in the application as filed regarding the determination method of the parameter "number average molecular weight" (hereinafter "Mn") specified in claim 1 of that request led to a lack of clarity (Article 84 EPC). In that respect, although it could be agreed that the general method to be used was size exclusion chromatography (SEC), the absence of information regarding the standards to be used for calibration and the nature of the detector to be used did not allow to determine Mn within the limit of measurement accuracy.
- IV. In their statement of grounds of appeal the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the sole request filed therewith, which was identical to the request dealt with in the decision under appeal. The appellant further requested the reimbursement of the appeal fee in view of a substantial procedural violation (right to be heard).

In addition, oral proceedings were requested in case the above request regarding the grant of a patent on the basis of the sole operative request were not allowed.

Furthermore, the remittal of the case to the department of first instance for further prosecution was requested

if the Board were to overturn the decision of the examining division in respect of clarity and had other concerns in regard to fulfillment of the EPC.

Also, the following document was filed:

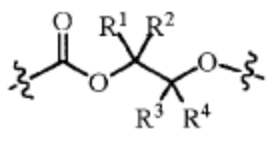
A2: Affidavit by S.D. Allen, dated 30 March 2020

V. With letter of 9 March 2023, the appellant indicated that they withdrew their request for oral proceedings in case the Board decided to overturn the decision under appeal and remit the case to the examining division for further prosecution, as was indicated in the minutes of the telephone conversation held on 6 February 2023. Also, the request for reimbursement of the appeal fee was withdrawn.

VI. Claims 1, 12 and 14 of the request filed with the statement of grounds of appeal read as follows:

"1. A polymer composition comprising aliphatic polycarbonate chains having epoxy functional groups, wherein

the aliphatic polycarbonate comprises a repeating unit having a structure:



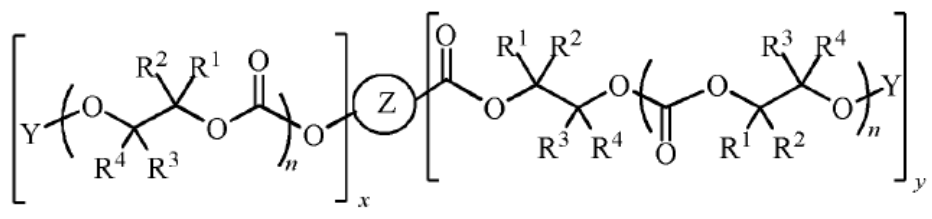
where  $R^1$ ,  $R^2$ ,  $R^3$ , and  $R^4$  are, at each occurrence in the polymer chain, independently selected from the group consisting of -H, fluorine, and an optionally substituted  $C_{1-20}$  aliphatic group, where any two or more

of R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> may optionally be taken together with intervening atoms to form one or more optionally substituted rings optionally containing one or more heteroatoms; and

**the number average molecular weight of the aliphatic polycarbonate chains is on average in the range of about 500 g/mol to about 500,000 g/mol;**

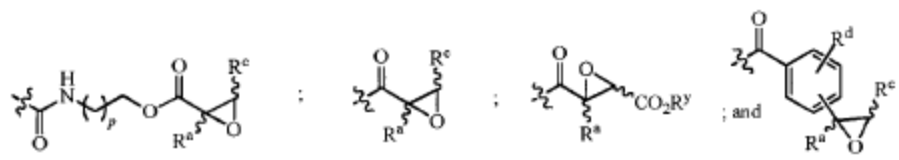
wherein

the epoxy functional groups are disposed at one or more ends of the aliphatic carbonate chains; and  
the polymer composition comprises aliphatic polycarbonate chains having a formula:



wherein:

(i) Y is, at each occurrence, independently selected from the group consisting of:



wherein R<sup>a</sup> and R<sup>b</sup>, are, at each occurrence, independently selected from the group consisting of -H, halogen, an optionally substituted C<sub>1-20</sub> aliphatic group, an optionally substituted C<sub>1-20</sub> heteroaliphatic group, an optionally substituted acyloxy group, an

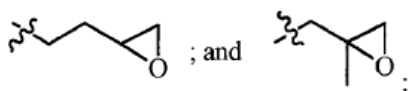
optionally substituted acyl group, an optionally substituted alkoxy group, an optionally substituted carbocyclic group and an optionally substituted heterocyclic group, where any two or more  $R^a$  and  $R^b$  groups may optionally be taken together with intervening atoms to form one or more optionally substituted rings optionally containing one or more heteroatoms;

$R^c$ , is at each occurrence, independently selected from the group consisting of -H, an optionally substituted  $C_{1-20}$  aliphatic group, an optionally substituted  $C_{1-20}$  heteroaliphatic group, an optionally substituted carbocyclic group and an optionally substituted heterocyclic group, where any two or more  $R^c$  groups may optionally be taken together with intervening atoms and any  $R^a$  or  $R^b$  group to form one or more optionally substituted rings optionally containing one or more heteroatoms;

$R^d$  is, at each occurrence, independently selected from the group consisting of: halogen,  $-NO_2$ ,  $-CN$ ,  $-SR^Y$ ,  $-S(O)R^Y$ ,  $-S(O)_2R^Y$ ,  $-NR^Y C(O)R^Y$ ,  $-OC(O)R^Y$ ,  $-CO_2R^Y$ ,  $-NCO$ ,  $-N_3$ ,  $-OR^Y$ ,  $-OC(O)N(R^Y)_2$ ,  $-N(R^Y)_2$ ,  $-NR^Y C(O)R^Y$ ,  $-NR^Y C(O)OR^Y$ ; or an optionally substituted radical selected from the group consisting of  $C_{1-20}$  aliphatic;  $C_{1-20}$  heteroaliphatic; phenyl; a 3- to 8-membered saturated or partially unsaturated monocyclic carbocycle, a 7-14 carbon saturated, partially unsaturated or aromatic polycyclic carbocycle; a 5- to 6-membered monocyclic heteroaryl ring having 1-4 heteroatoms independently selected from nitrogen, oxygen, or sulfur; a 3- to 8-membered saturated or partially unsaturated heterocyclic ring having 1-3 heteroatoms independently selected from nitrogen, oxygen, or sulfur; a 6- to 12-membered polycyclic

saturated or partially unsaturated heterocycle having 1-5 heteroatoms independently selected from nitrogen, oxygen, or sulfur; or an 8- to 10-membered bicyclic heteroaryl ring having 1-5 heteroatoms independently selected from nitrogen, oxygen, or sulfur; where each occurrence of  $R^Y$  is independently -H, or an optionally substituted radical selected from the group consisting of  $C_{1-6}$  aliphatic, 3- to 7-membered heterocyclic, phenyl, and 8- to 10- membered aryl, and where two or more adjacent  $R^d$  groups can be taken together to form an optionally substituted saturated, partially unsaturated, or aromatic 5- to 12-membered ring containing 0 to 4 heteroatoms; or

(ii) Y is independently selected from the group consisting of:



p is from 1 to 6, inclusive; and

(z) is a multivalent moiety,

x and y are each independently from 0 to 6, where the sum of x and y is between 2 and 6, inclusive, and

n is independently at each occurrence from 2 to 1000"

(emphasis by the Board on page 4 to highlight the feature which is most relevant to the present decision).

"12. The polymer composition of claim 10, characterized in that the aliphatic polycarbonate chains have:



an Mn between about 500 g/mol and about 20,000 g/mol, greater than 90% carbonate linkages on average, and at least 90% of the end groups comprise epoxide-containing moieties."

"14. The polymer composition of claim 12, having an Mn between about 800 and about 5,000 g/mol; or having an Mn between about 1,000 and about 4,000 g/mol; or having an Mn of about 1,000 g/mol; or having an Mn of about 2,000 g/mol; or having an Mn of about 3,000 g/mol; or having an Mn of about 4,000 g/mol; or having an Mn of about 5,000 g/mol; or having an Mn of about 8,000 g/mol."

VII. The appellant's arguments, in so far as they are pertinent for the present decision, may be derived from the reasons for the decision below. They are essentially as follows:

- (a) The number average molecular weight parameter (Mn) as defined in operative claim 1 was so broad that it had no technical relevance and was irrelevant for delimiting the claims from the prior art. Therefore, that parameter did not need to be examined for compliance with Article 84 EPC.
- (b) Considering that D8 and D9 were not directed to the specific polymers defined in operative claim 1, the conclusions reached by the examining division from these documents did not mandatorily apply to the present case. In addition, as stated in A1 and A2, the skilled person not only knew that size exclusion chromatography (SEC) should be used but

also knew how to calibrate SEC and which detector should be used to determine Mn in a reliable manner for the type of polymers according to said claim 1.

(c) Numerous European patents were granted with claims defining a chemical compound without specifying the method of determination of Mn, in particular without specifying the calibration procedure and detector to be used. It would be contrary to the legal principle of protection of legitimate expectations if the EPO were to grant patent claims specifying Mn without also specifying the test method in some cases, while refusing some patent applications for lack of clarity because they did not provide such information in other cases.

(d) In view of the above, the decision of the examining division regarding Article 84 EPC should be overturned.

### **Reasons for the Decision**

1. In view of the appellant's requests (sections IV and V above) and considering that the Board arrived at the conclusion that the decision under appeal was to be overturned and the case was to be remitted to the examining division for further prosecution, the present decision can be issued in written proceedings.
2. The sole operative request was filed together with the statement of grounds of appeal and is identical to the sole request dealt with in the decision under appeal, which was refused for lack of clarity because the parameter "number average molecular weight" (Mn)

specified in claim 1 thereof was held to lead to a lack of clarity pursuant to Article 84 EPC.

3. Reading of claim 1

3.1 The appellant argued that the range of Mn defined in operative claim 1 was so broad, that virtually all relevant aliphatic polycarbonate compositions fell within that range. Therefore, even if the Mn parameter were unclear, which was contested, said parameter was irrelevant for delimiting the claims from the prior art. Under these circumstances, that parameter had no technical relevance and did not need to be examined for compliance with Article 84 EPC.

3.2 The Board cannot agree with this position. Indeed, the Mn feature could only be held to be irrelevant if it were redundant in view of the other features specified in operative claim 1, which was neither shown, nor even argued by the appellant to be the case. In addition, considering the chemical formula of the aliphatic polycarbonate specified in operative claim 1, there is no reason to expect that this is the case for the polycarbonates exhibiting the chemical structure according to said claim 1, since it is to be expected that there may exist such chemical components with a Mn either below 500 g/mol or above 500,000 g/mol. Therefore, it cannot be agreed with the appellant that the Mn feature is technically irrelevant and is not essential for determining the boundaries of claim 1.

3.3 In addition, the appellant's argument would not be valid for the more limited ranges/values of Mn (as compared to claim 1) specified in operative claims 12 and 14.

3.4 Furthermore, the requirement of clarity is meant to ensure that the skilled person can determine unambiguously the scope of the subject-matter for which protection is sought, in particular in order to know when (s)he is working within or outside the ambit of the claim. In view of that, the question to be answered when assessing clarity is whether or not the boundaries of the claim are unambiguously defined. Therefore, the fact that the range of Mn indicated in operative claim 1 is broad and was not shown to constitute a distinguishing feature over the prior art (up to now) cited, as put forward by the appellant, is not relevant.

4. Clarity objections retained by the examining division

4.1 The examining division decided that the Mn feature according to operative claim 1 lacked clarity because it was not unambiguously defined. In that respect, it was not argued by the examining division that Mn was an unusual parameter. Rather, it was accepted by the examining division that, as argued by the appellant, Mn was commonly determined by size exclusion chromatography (SEC), which is a liquid chromatography method in which a sample is separated by passing it through a column filled with a porous material, whereby the constituents of said sample are separated according to their molecular weight and the concentration/amount of the separated/eluted constituents is determined by a detector to yield a distribution curve. It is further known in the art and derivable from e.g. D7 (Table 4.12), D10 (page 24, end of the first full paragraph) and D11 (page 53, last paragraph; bottom of page 54; page 57, paragraph preceding section 2.6.2), that the determination of Mn by SEC is a relative method, in which the actual Mn of e.g. a polymer is

determined on the basis of a calibration procedure obtained by passing down in the same SEC system polymers of known molecular weight and if possible of similar structure to the sample to be tested (called "standards").

4.2 It is not contested by the appellant that the application as filed contains no information regarding how Mn is (to be) determined. Since, in the Board's view, the Mn feature is a limiting feature of operative claim 1 (see section 3 above), the question to be answered is whether or not it may be agreed with the examining division that more details regarding the calibration method and the detectors used to determine the Mn parameter specified in operative claim 1 are required in order to allow an unambiguous determination of the boundaries of the subject-matter being claimed.

4.3 The appellant argued that the conclusions of the examining division were reached considering the teaching of D8 and D9 regarding the determination of Mn. However, since these documents were not directed to the specific polymers defined in operative claim 1, namely aliphatic polycarbonate chains having epoxy functional groups as defined therein, these conclusions were of a mere theoretical nature and did not mandatorily apply to the technical area of interest of the present application. In particular, according to the appellant, the examining division provided no evidence in support of their objections.

4.3.1 However, D8 is a section of a textbook related to the use of SEC to determine molecular weight of polymers in general. Therefore, the Board sees no reason why the teaching of D8 would not apply to the determination of

Mn of the polymers defined in operative claim 1.

- 4.3.2 Regarding D9, it is agreed with the appellant that that document refers to very specific polymers, namely (highly) branched polymers (see in particular section 1 of the "Conclusions" on page 1156 of D9), whereby D9 only discloses copolymers of styrene and divinylbenzene and homopolymers of divinylbenzene. In addition, D9 is directed to (highly) branched polymers, which have a different structure than the ones defined in operative claim 1, as argued by the appellant (statement of grounds of appeal: pages 7-9). Also, the conclusions reached in D9 are directly related to the specific (highly) branched structure of the polymers studied therein (D9: abstract; page 1155, left column, below "Results and Discussion"; page 1156, left column, paragraph starting with "For branched polymers, ..."; table 3; page 1158: points 3 and 4 of the section "Conclusions"). Under these circumstances, it is agreed with the appellant that it cannot be concluded that the conclusions reached in D9 apply mandatorily to the polymers defined in operative claim 1, as held by the examining division.

*Calibration of the SEC method*

- 4.4 The appellant argued that, regarding the calibration procedure, D8 did not teach that without indication of the calibration procedure used the skilled person would be unable to determine Mn, as held by the examining division, but rather that the skilled person should carefully calibrate SEC in order to determine reliably Mn. In the case in hand, the skilled person knew very well how to calibrate SEC, as stated in A1 and A2, so the appellant.

- 4.4.1 In that respect, the Board agrees with the appellant that D8 teaches that, in order to determine  $M_n$  in a reliable manner, the skilled person should carefully calibrate SEC (see in particular the third and fourth paragraphs on page 77 of D8).
- 4.4.2 Regarding said calibration procedure, it is correct that it is derivable from D8 that care should be taken to carry out the calibration procedure using standards having a chemical structure similar to the one of the polymer under study (D8: page 77, third and fourth paragraphs). However, not only was it stated by two experts in the field of SEC that the skilled person knew how to carry out such a calibration procedure in order to allow a reliable determination of  $M_n$  for the types of polymers according to claim 1 (A1: sections 9 to 11; A2: sections 9, 10, 12), but it is further explicitly indicated in A2 which type of standards and detector would be used for that purpose (A2: sections 11 and 13), whereby it is further explained that the skilled person would know which type of column and solvent should be used in order to obtain a suitable separation for the range of molecular weight of interest (A2: section 14), which appears credible to the Board.
- 4.4.3 In that respect, the Board is satisfied that the additional information regarding the calibration procedure which is provided in A2 not only confirms that, as was already stated in A1, the skilled person knows which method should be used in order to determine  $M_n$  for the polymers being claimed in a reliable manner, but also shows that the skilled person would choose a method generally used for aliphatic polycarbonates. Under these circumstances, the requirements regarding an appropriate calibration indicated in D8 are

satisfied and the concerns expressed by the examining division (decision under appeal: second half of page 5, sentence starting with "The affidavit is silent about how..." and the following one) are herewith overcome.

- 4.4.4 In view of the above, the information provided in A1 and A2 shows that the skilled person would know how to determine Mn unambiguously using the standard method (SEC) commonly used in the art. For these reasons, the Board is satisfied that the Mn feature according to operative claim 1 does not lead to a lack of clarity pursuant to Article 84 EPC.

*Case law cited in the decision under appeal*

- 4.5 The examining division indicated that their decision on lack of clarity was in line with decisions T 541/09, T 849/11 and T 2063/12 (decision under appeal: page 3, third paragraph).
- 4.5.1 However, it is agreed with the appellant that the findings of T 2063/12 are not related to the clarity of an undisputedly common parameter, such as Mn in the present case, but rather of a parameter which was held to be unusual and for which no established measurement method existed (see the parameter "area proportion" mentioned in section 1.1 of the section "Reasons for the Decision" and defined on the basis of features (1) to (9) in section VII of the section "Facts and Submissions"). To the contrary, as pointed out by the appellant, a parameter which is analogous to Mn, namely weight average molecular weight (Mw), was present in claim 1 of the main request dealt with in T 2063/12 but was not objected to as lacking clarity, either by the Board or by the examining division.



- 4.5.2 It is also agreed with the appellant that although decision T 541/09 deals with a similar parameter than Mn, namely Mw (i.e. weight average molecular weight), the issue at stake in that decision was sufficiency of disclosure and not clarity (see T 541/09: section 4). In that respect, it is agreed with the analysis of the appellant (statement of grounds of appeal: page 19, second and third paragraph), that the Board held in that case that the patent in suit lacked any information how to ensure that a polymer effectively had a Mw within the narrow range specified in the operative claims, which was an essential element of the invention. In addition, case T 541/09 further differs from the present one in that no indication of which measurement method was to be used to determine Mw was indicated in the patent specification, whereas in the present case it was agreed that essentially only one measurement method was commonly employed to determine the number average molecular weight for the claimed aliphatic polycarbonate chains, namely SEC.
- 4.5.3 In view of the above, since the circumstances of the present case are different from the ones of T 541/09 and T 2063/12, these decisions are not relevant for the case at hand.
- 4.5.4 Finally, it is derivable from section 1.1 of the reasons of T 849/11 that it was held therein that the requirements of clarity were satisfied if the applicant/patent proprietor convincingly showed that the method to be employed belonged to the skilled person's common general knowledge. Considering that in the present case the information provided in A1 and A2 are held to meet that requirement (as outlined in section 4.4 above), the Board is satisfied that the arguments provided by the appellant in appeal are

sufficient to fulfill the criterion of T 849/11. The fact that the examining division reached a different conclusion provides no reason to deviate from that view since the above conclusion was reached in appeal based on additional information provided in A2, which was submitted by the appellant with the statement of grounds of appeal and was, therefore, not at the disposal of the examining division.

- 4.5.5 In view of the above, the decisions cited by the examining division provide no cause for the Board to deviate from the conclusion reached in section 4.4.4 above.

*Protection of legitimate expectations*

- 4.6 The appellant argued additionally that many European patents which contained claims defining the molecular weight of a chemical compound without specifying the method of its determination, in particular without specifying the calibration procedure and detector to be used, had been and were still granted by the EPO. It would be contrary to the legal principle of protection of legitimate expectations and arbitrary if the EPO were to grant patents specifying Mn without also specifying the test method in many cases while raising a clarity objection in other ones.

- 4.6.1 In that respect, it has first to be taken into account that the average molecular weight (either by number Mn or by weight Mw) is one of the most common parameters used in the present technical field to characterise polymers. The Board agrees with the appellant that it is a long standing practice, also in patents/patent applications, to disclose these parameters without providing (full) information regarding the calibration

procedure, the reason being that it can be expected that the skilled person knows how to reliably determine this parameter. The appellant has cited some patents in which this was indeed done (statement of grounds of appeal: bottom of page 23) but the Board is aware that many more examples could have been cited.

- 4.6.2 The fact that the absence of information regarding the calibration method used to reliably determine  $M_n$  is usually held not to be necessary does not only concern patent specifications or patent applications but also documents of the prior art that are usually compared with the subject-matter being claimed, in particular to assess novelty and inventive step. However, also in that respect it is common practice to consider that the disclosure of  $M_n$  or  $M_w$  is valid *per se*, independently of the presence or not of any information regarding the calibration procedure used.
- 4.6.3 In the present case, it was further neither shown, nor even argued that the polymers defined in operative claim 1 were for any reasons special, in the sense that the skilled person would consider that it would be necessary to depart from the SEC method which may usually be considered for determining  $M_n$  for that kind of polymers, namely aliphatic polycarbonates (including the standards and the detector generally used for aliphatic polycarbonates). To the contrary, it is indicated in A1 and/or A2 that this would not be the case and no evidence to the contrary is on file.
- 4.6.4 The above indicated long standing practice confirms, in the Board's view, both the conclusion reached in section 4.4.4 above and that it is justified that the decision of the opposition division regarding (lack of)

clarity of Mn be overturned.

5. Remittal

5.1 As explicitly stated in Article 12(2) RPBA 2020, the primary object of the appeal proceedings is to review the decision under appeal. In the case at hand, the decision under appeal only addresses the issue of clarity pursuant to Article 84 EPC and no further information is given regarding any other requirements of the EPC.

5.2 The appellant mentioned that the examining division indicated on page 2 of its preliminary opinion sent in preparation of the summons to oral proceedings that they would acknowledge industrial applicability, sufficiency of disclosure, novelty and inventive step (statement of grounds of appeal: page 3, first full paragraph). However, in the Board's view, the passage of the preliminary opinion relied upon by the appellant merely indicates that clarity is "the main issue regarding the present application", which does not mandatorily mean that the examining division thereby acknowledged that there are no other relevant issues. In addition, it is standard practice that an additional search for relevant prior art documents is carried out by the examining division at a later stage of the examination proceedings, e.g. shortly before granting an application, in order to retrieve documents which were possibly not available when drafting the European search report ("top-up search"). There is no evidence on file that this was already done here.

5.3 In view of the above, the Board considers that there are special reasons in the sense of Article 11 RPBA 2020 which justify a remittal of the case to the

department of first instance for further prosecution.

- 5.4 As a measure of precaution it is noted that the fact that the case is remitted does not mean that the Board effectively has "other concerns in regard to fulfillment of the EPC", as indicated as a conditional measure in the appellant's request for remittal. Rather, that decision is solely taken in view of the content of the decision under appeal and of the current stage of the proceedings.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated