

**Internal distribution code:**

- (A) [ - ] Publication in OJ
- (B) [ - ] To Chairmen and Members
- (C) [ - ] To Chairmen
- (D) [ X ] No distribution

**Datasheet for the decision  
of 22 November 2016**

**Case Number:** T 0359/13 - 3.3.03

**Application Number:** 06715609.1

**Publication Number:** 1865027

**IPC:** C08L69/00, C08J5/18, C08K3/38,  
B32B27/36, B32B27/18, B60J1/00,  
E06B5/00

**Language of the proceedings:** EN

**Title of invention:**

POLYCARBONATE RESIN COMPOSITION AND HOT RADIATION SHIELDING  
MOLDED PRODUCT

**Patent Proprietor:**

MITSUBISHI ENGINEERING-PLASTICS CORPORATION

**Opponent:**

Covestro Deutschland AG

**Headword:**

**Relevant legal provisions:**

EPC Art. 56, 84, 100, 123(2), 123(3)  
EPC R. 80  
RPBA Art. 12(4)

**Keyword:**

Inventive step - (yes)

Sufficiency of disclosure - (yes)

Claims - clarity (yes)

Amendment occasioned by ground for opposition - (yes)

Amendments - extension beyond the scope beyond the claims as granted - (no) - added subject-matter (no)

Late submitted material- admitted - (no) - could have been submitted during first instance proceedings

**Decisions cited:**

G 0001/99, T 0223/97, T 0023/04

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

European Patent Office  
D-80298 MUNICH  
GERMANY  
Tel. +49 (0) 89 2399-0  
Fax +49 (0) 89 2399-4465

Case Number: T 0359/13 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 22 November 2016**

**Appellant:** Covestro Deutschland AG  
(Opponent) Kaiser-Wilhelm-Allee 60  
51373 Leverkusen (DE)

**Representative:** Davepon, Björn  
Schlossstraße 74  
41363 Jüchen (DE)

**Respondent:** MITSUBISHI ENGINEERING-PLASTICS CORPORATION  
(Patent Proprietor) Shiodome Sumitomo-Bldg. 25F, 9-2  
Higashi-shinbashi 1-Chome, Minato-ku,  
Tokyo 105-0021 (JP)

**Representative:** Hoffmann Eitle  
Patent- und Rechtsanwälte PartmbB  
Arabellastraße 30  
81925 München (DE)

**Decision under appeal:** **Interlocutory decision of the Opposition**  
**Division of the European Patent Office posted on**  
**14 December 2012 concerning maintenance of the**  
**European Patent No. 1865027 in amended form.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** M. C. Gordon  
R. Cramer

## Summary of Facts and Submissions

- I. The appeal of the opponent lies from the interlocutory decision of the opposition division posted on 14 December 2012 according to which it was held that European patent number 1 865 027 could be maintained in amended form on the basis of the second auxiliary request, consisting of 8 claims and filed during oral proceedings on 16 November 2012.
- II. The application as filed had 9 claims whereby claims 1, 4, 5 and 9 read as follows:
- "1. A polycarbonate resin composition comprising 100 parts by weight of aromatic polycarbonate resin having a concentration of end hydroxyl group of 100 to 1800 ppm and 0.0001 to 5 parts by weight of fine particles of boride of at least one metal selected from the group consisting of La, Ce, Pr, Nd, Tb, Dy, Ho, Y, Sm, Eu, Re, Tm, Yb, Lu, Sr and Ca.
4. A polycarbonate resin composition according to any one of claims 1 to 3, wherein the concentration of end hydroxyl group of aromatic polycarbonate resin is 300 to 1500 ppm.
5. A heat ray shielding molded product formed by molding the polycarbonate resin composition as defined in any one of claims 1 to 4, which molded product has a plate-like portion having a thickness of 0.2 to 10 mm, a haze of less than 5% and a solar transmittance of not more than 70%.
9. Window or window parts for usual buildings or vehicles comprising the heat ray shielding molded product as defined in claims 5 to 8."

III. The patent was granted on the basis of 8 claims wherein claim 1 differed from originally filed claim 1 by specifying the content of hydroxyl groups as in claim 4 of the application as filed and further in that the boride was defined as being selected "from" rather than "from the group consisting of".

Claim 4 differed from claim 5 as originally filed by specifying that the properties of haze and solar transmittance were measured using a planar plate of 3mm thickness and further in that the standards used for the measurement were specified.

Claim 8 corresponded to claim 9 of the application as filed but read "Window or [...] comprising the moulded product **of** any of claims 4-7".

IV. An opposition against the patent was filed in which the grounds pursuant to Article 100(a) EPC in combination with Article 56 EPC and the grounds pursuant to Article 100(b) EPC were invoked.

Following issue of the communication of the opposition division pursuant to Rule 116(1) EPC the opponent invoked the ground of opposition pursuant to Article 100(c) EPC.

The following documents, *inter alia*, were cited in support of the opposition:

- E2: WO 03/095561 and the corresponding German patent DE 103 92 543 (E2a)
- E3: US 2004/0071957
- E4: WO 03/020805
- E5: US 2004/260049.

V. The decision of the opposition division was based on the claims of the patent as granted as the main request and two sets of claims forming a first and second auxiliary request, both submitted during the oral proceedings before the opposition division.

Claims 1, 4 and 8 of the second auxiliary request read as follows:

"1. A polycarbonate resin composition comprising

- 100 pbw of aromatic polycarbonate resin having a concentration of end hydroxyl group of 300-1500 ppm, and
- 0.0001-5 pbw of fine particles of boride of at least one metal selected from the group consisting of La, Ce, Pr, Nd, Tb, Dy, Ho, Y, Sm, Eu, Re, Tm, Yb, Lu, Sr and Ca.

4. The use of the composition of any of claims 1-3 for the manufacture of heat ray shielding molded product having a plate-like portion having

- a thickness of 0.2-10mm
- a haze, measured According [sic] to JUS K-7105 using a NDH-2000 type haze meter (Nippon Denshoku Industries Co., Ltd.), of less than 5%; and
- a solar transmittance, determined by measuring the light transmittance in the range of 300-2500 nm using a U-3100PC type spectrophotometer (Shimadzu Corp.) and calculating the solar transmittance according to JIS R-3106, of not more than 70%.

8. Window or window parts for usual buildings or vehicles comprising the heat ray shielding molded product as defined in any of claims 4-7."

According to the decision, the late filed ground of

opposition pursuant to Article 100(c) EPC was admitted to the procedure.

The main request was held not to meet the requirements of Article 123(2) EPC *inter alia* because the feature relating to the "planar plate of 3mm thickness" was only associated with the specific experimental measurements taken whereas the general disclosure related to the haze and solar transmittance of a plate-like portion of thickness 0.2 to 10 mm.

The first auxiliary request in which claim 4 had been amended by deleting the reference to the "planar plate of 3mm thickness" was found not to meet the requirements of Article 123(3) EPC since the removal of said feature resulted in a broadening of the claim as granted and hence an extension of the protection conferred.

The second auxiliary request was held to meet the requirements of the EPC.

VI. The opponent (appellant) lodged an appeal against the decision.

Objections pursuant to Rule 80 EPC, Articles 84 and 100(a), (b), and (c) were raised. It was requested that five further documents, designated E8-E12 be admitted to the procedure in support of the objection of lack of inventive step.

VII. In the reply the patent proprietor (respondent) requested dismissal of the appeal, i.e. that the patent be maintained in the form as decided upon by the opposition division. Five further sets of claims constituting first to fifth auxiliary requests were

filed. It was requested that E8-E12 not be admitted to the procedure.

VIII. Following a further exchange of written submissions the board issued a summons to attend oral proceedings and a communication setting out its preliminary view of the case.

IX. Oral proceedings were held on 22 November 2016.

X. The arguments of the appellant can be summarised as follows:

(a) Rule 80 EPC

The amendment of claim 4, changing the category from a product claim to a use claim meant in effect that an entirely new claim had been created. The introduction of this new claim was not justified by a ground of opposition and hence was inadmissible pursuant to Rule 80 EPC. Reference was made to the findings of T 223/97 of 3 November 1998. It was irrelevant that claim 4 as granted was the object of an objection pursuant to Article 123(2) EPC. Furthermore whereas original granted claim 4 was directed to a moulded composition, the amended claim 4 left the manner of forming the composition open.

(b) Article 100(c)/123(2) EPC.

The specific measurement methods introduced into claim 4 were originally disclosed only in the context of the specific examples but not for the general case. Hence it was inadmissible to specify these in the claim. As demonstrated by an extract of Wikipedia, filed as E7 together with the statement of grounds of appeal, two different



measurement methods for haze are generally known in the art, giving results in six different units whereby that employed in the patent - percentage - was not included. This demonstrated that the skilled person would not have derived from the application as filed that the method employed in the examples of the patent was disclosed as corresponding to the general case with the consequence that inclusion of this in the claim contravened Article 123(2) EPC.

(c) Article 123(3) EPC

The deletion from claim 4 of the requirement that the haze and solar transmittance were measured on a planar plate of 3mm thickness meant that the scope of protection of the claim had been extended compared to that of the corresponding claim of the patent as granted.

(d) Article 84 EPC

Claim 8 was directed to a window comprising the heat ray shielding moulded product as defined in any of claims 4-7. The referenced claims were however directed to the use of a composition according to any of claims 1 to 3 but not to a moulded product. Hence claim 8 was unclear.

(e) Article 100(b) EPC

Claim 7 was directed to a product with defined colour coordinates L, a and b. The examples showed that the required colour values were obtained only by addition of defined amounts of specific colourants. The patent taught a wide range of possible colourants and concentrations. It constituted an undue burden for the skilled person to identify appropriate types and amounts of

colourants.

(f) Article 100(a)/56 EPC

The closest prior art was E2a, which however did not specify the hydroxyl group content of the polycarbonate. There was no example in the patent corresponding to the teaching of E2a and hence no evidence of any effect with respect thereto. During the oral proceedings before the board it was argued for the first time that although example 2 and Reference Example 3 appeared to show a link between the hydroxyl group content and haze, it emerged from the description of the patent and was confirmed by the examples that another feature was critical, namely the content of heterogenous groups. Since this feature was not specified in the claim, the problem could not be seen as solved over the entire scope, meaning that a reformulation of the problem, viz. the provision of further compositions, was appropriate. The claimed solution was rendered obvious by E5 which showed that polycarbonates with hydroxyl group content in the claimed range provided useful properties.

Even if the problem were considered to be the improvement of haze, the solution was obvious. In this connection it was noted that E5 related to polycarbonate compositions exhibiting good processability as well as good optical properties whereby hue was explicitly mentioned. The examples of E5 showed a relationship between the content of hydroxyl groups and the resulting hue, directing attention towards the range as now claimed. Furthermore E5 addressed the haze as an indication of hydrolytic stability and taught the need to restrict the content of hydroxyl groups to values

of 100 to 1500 ppm, preferably 200 to 1000 ppm, i.e. broadly corresponding to the range as now claimed. This consideration would automatically lead to the required restriction of the OH groups. The evidence of E5 relating to the effect of the hydroxyl group content on haze furthermore corresponded to and confirmed that demonstrated in the patent in suit. In particular example 7 of E5 showing a hydroxyl group content of 900 ppm was invoked. This teaching was not countered by the evidence of example 10 of E5 showing a poor haze, since this was clearly a consequence of the ultramarine pigment used for which no particle size was given and which could not be compared to the fillers employed according to E2a and the patent in suit.

Analogous conclusions would be reached starting from E3 and/or by consideration of the teaching of E4 instead of E5.

- (g) Regarding documents E8-E12 these had been submitted in response to the grounds of the decision of the opposition division from which - for the first time - it became clear how the opposition division viewed the objective technical problem. During the opposition proceedings the opponent had pursued a different approach, although that based on E8-E12 had indeed been considered as an alternative but not submitted.

XI. The arguments of the respondent can be summarised as follows:

- (a) Rule 80 EPC

The amendment to claim 4 as granted was in order to

address an objection pursuant to Article 123(2) EPC in respect of the feature relating to the 3mm planar plate. Deletion of this - restricting - feature would have resulted in contravention of Article 123(3) EPC. Consequently the claim was reformulated as a use claim, but was directed to the same subject-matter as the granted claim 4. Regarding the question of moulding, since the use is for the manufacture of a moulded product the aspect of moulding was at least implicitly present in the use.

(b) Article 100(c)/123(2) EPC

The reasoning of the decision was correct. It was clear from the disclosure of the application that the measurement method of the examples was that to be applied for the measurement of the respective properties in claim 4. The existence of further methods for example as set out in E7 could not change this fact. Consequently E7 was irrelevant and should not be admitted to the proceedings.

(c) Article 123(3) EPC

Regardless of whether the scope of claim 4 might have been extended by removing the restriction to the thickness of the sample, the scope of protection of a patent was defined by the broadest claim, which in the present case was directed to the composition (claim 1) independently of any use.

(d) Article 84 EPC

Claim 8 was directed to a window comprising the composition as **defined in** any of claims 4-7, not a window comprising the composition **of** any of claims 4-7 (emphasis of the respondent). Claim 4 defined a moulded product which was further specified in

claims 5-7. Thus claim 8 did not refer to the subject-matter claimed in claims 4-7 in its totality but to a specific aspect thereof.

(e) Article 100(b) EPC

The patent in suit explained that the hue could be adjusted, if necessary, by incorporation of suitable dyes and pigments and defined in detail the suitable materials and the amounts thereof.

(f) Article 100(a)/56 EPC.

It was concurred that E2a was the closest prior art and that the distinguishing feature was the content of hydroxyl groups. The lack of a direct comparison with E2a was acknowledged. However since the content of hydroxyl groups in the polycarbonate of E2a was unknown, such a direct comparison was inherently impossible. In any case, it would have been for the opponent to provide evidence in respect of the (non)existence of an effect with respect to E2a. Regarding the objection in respect of heterogeneous units, firstly this was late filed, having never been raised prior to the oral proceedings before the board. In any case, the examples of the patent showed that the effect of the content of heterogeneous structure on haze was minor and negligible compared to that arising from the hydroxyl group content. Further, the statements in respect of the influence of heterogeneous structure in the patent were of a speculative nature and this content was not indicated to be the primary determinant in respect of haze. Thus the evidence did not support the position of the appellant that the absence of a definition of the heterogenous structure content would mean that the problem with respect to E2a had to be formulated as

being merely the provision of alternative composition. E5 did not focus on the optical properties but on the mechanical properties of the containers and the moulding mass, e.g. the melt stability. Haze was employed in E5 merely as an indication of the hydrolytic stability. There was no teaching linking the hydroxyl content to the haze in E5. On the contrary E5 supported inventive step. Example 10 thereof employed a pigment - ultramarine - which like the borides of the patent in suit remained dispersed in the polycarbonate. The resulting composition of E5 had poor haze value. In contrast the patent showed that even with particulate pigment a low haze was obtained.

XII. 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, or alternatively that the decision under appeal be set aside and the patent be maintained in amended form on the basis of one of the first to fifth auxiliary requests filed with the reply to the statement of grounds of appeal. It further requested that documents E8 to E12 not be admitted to the proceedings.

### **Reasons for the Decision**

1. Main request

1.1 Rule 80 EPC

Granted claim 4 was directed to a moulded product characterised by the range of thickness and certain properties as determined on a 3mm thick specimen. The presence in the granted claim of measurement methods

for certain of the properties, which had been introduced during examination, was the subject of an objection that introduction of a limitation in respect of the thickness of the sample used for the determinations contravened Article 123(2) EPC. The opposition division followed this objection (section 3.2 of the reasons for the decision). In objecting to operative claim 4 which has been amended in the light of this objection, the appellant did not dispute that the amendment made was occasioned by a ground of opposition pursuant to Article 100 EPC, nor that the underlying objection pursuant to Article 123(2) EPC has been addressed by the amendment made. The appellant however took the position that the respondent was not entitled to make the amendment, i.e. reformulating the claim as a use claim.

In support of this position reference was made to T 223/97. The decision in question however appears to relate to a different situation, namely wherein an objection to the main and hence independent claim was addressed by introducing further independent claims while maintaining the main claim. In the present case the claim which was the subject of objection was a product claim defined through the use of the composition of claims 1 to 3 and as now amended refers to the use of such a composition for the manufacture of a product. Because the situation is different to that considered in T 223/97, it is not apparent to the board why the findings of said decision are applicable.

What is relevant in the present case is that Rule 80 EPC does not place any restriction on the form of amendments a patent proprietor may (seek to) make to address objections raised. On the contrary, a patent applicant or proprietor is free to draft proposed

amendments to the specification in any manner considered appropriate. Even in the situation considered in G 1/99 where the requirements of the principle of no *reformatio in peius* impose restrictions on the manner in which the claims may be amended, an opponent as appellant has no right to prescribe the form of the amendments which the patent proprietor as respondent may make (see T 23/04 section 2.5.3 of the reasons). The fact that by means of the amendments the objection under Article 123(2) EPC was overcome (see point 1.2 below), which was not the case with the requests rejected by the opposition division, provides further confirmation that the amendments were occasioned by a ground of opposition. Accordingly the objection pursuant to Rule 80 EPC is not correct. The requirements of Rule 80 EPC are satisfied.

1.2 Article 100(c)/123(2) EPC

Operative claim 4 is directed to the use of the composition of claim 1 for the manufacture of a heat ray shielding product. The product so prepared is defined by the thickness, the haze and solar transmittance, each as measured by defined instruments/methods. Claim 5 as originally filed was directed to such a product of the thickness range as now defined and specified the haze and solar transmittance without any limitation as to the methods/instruments to be employed for the measurement. The appellant argued that the measurement methods were disclosed only in the context of the specific examples but not in general.

The board disagrees. The skilled person upon reading the application would consult the examples to understand the details of the measurements underlying the properties specified in original claim 5. It is not



the case that in the application as originally filed either no measurement methods were disclosed or that a plurality of possible measurement methods for each of the different properties was originally disclosed, from which a selection had to be made. Nor is it the case that differing measurement methods for the same property on various types of heat ray shielding products were disclosed in the application, one of these disclosures now having been generalised to any kind of heat ray shielding product. On the contrary, the application as originally filed discloses a single measurement method and set of conditions for each of the properties defined in claim 5, which methods are now defined in operative claim 4. The disclosure of the application as originally filed was hence that the said properties were to be determined by indicated methods, meaning that the definition of the methods in the claim does not add subject-matter to that contained in the application as originally filed.

The argument of the appellant that other measurement methods were known in the art, and/or that the manner of reporting the haze in the patent was not consistent with such known methods is not based on the disclosure of the application as originally filed and hence cannot serve to demonstrate that there is a lack of a basis therein for the amendment now made. In that respect evidence of the existence of other measurement methods, such as document E7, is of no relevance, so that the board does not need to decide on its admittance into the proceedings.

Hence the introduction of the measurement methods to the claim is in conformity with the requirements of Article 123(2) EPC.

1.3 Article 123(3) EPC

Operative claim 4 confers protection for the use of the composition of claim 1 for the preparation of defined articles. Granted claim 4 defined the heat ray shielding product in terms of its dimensions and the properties of haze and solar transmittance when determined using a sample of defined thickness (3mm). This restriction in respect of the sample used for said measurements has now been removed. Consequently claim 4 now does indeed confer protection on a different - broader - range of products in the context of the use claim than did granted claim 4.

However granted claim 1 conferred protection on the resin composition itself, independent of any configuration, form or use thereof. Consequently granted claim 1 defined a broader scope of protection than granted claim 4. Since the scope of protection conferred by operative claim 4 is within that of granted claim 1, there has been no extension of the scope of protection beyond that of the patent as granted in its totality.

Consequently the requirements of Article 123(3) EPC are met.

1.4 Article 100(b) EPC

The objection raised relates to the use of dyes or pigments to control the visibility, as discussed in paragraphs [0052]-[0054] of the patent in suit. The objections of the appellant rely on the observation that a range of colourants and a range of concentrations thereof are given and the assertion that the skilled person would be confronted with an undue

burden to realise the subject matter of claim 7. The appellant has not explained why, in view of the information provided in the patent, the skilled person would not be able to put the subject-matter of claim 7 into practice, or why doing so would constitute an undue burden. Nor has any evidence been advanced to support the objection, e.g. in order to demonstrate that the information given in the patent is not sufficient to enable such adjustment of hue to be carried out.

The requirements of sufficiency of disclosure are satisfied.

#### 1.5 Article 84 EPC

Claim 8 is directed to a window or window part comprising a heat ray shielding moulded product "as defined in" any of claims 4-7.

This wording does not indicate that claim 8 is dependent from claims 4-7 but on the contrary refers in part for the specification of its subject-matter on the subject-matter of said claims.

Claims 4-7 are directed to the use of the composition of claims 1-3 for forming a product by moulding. Consequently claims 4-7 "define" a moulded product to the extent that they relate to the use of the composition of claims 1-3 to form said moulded product. Claim 8 relates to a specific embodiment of the moulded product resulting from the use of claims 4-7, and hence "defined" in said claims.

The subject-matter of claim 8 is thus clear in that it defines the nature of the article, the manner in which

it is formed and the material from which it is formed.

The requirements of Article 84 EPC are therefore satisfied.

1.6 Article 54 EPC

Objections under this provision of the EPC were not raised.

1.7 Article 56 EPC

1.7.1 The closest prior art

There was consensus between the parties that the closest prior art was equally represented by the teachings of E2 (reference being made to the corresponding German patent E2a) and E3. In the oral proceedings before the board the discussion focused on E2a assuming, as not contested by the parties, that its content corresponded to that of E2.

E2a relates according to claim 1 to a heat ray shielding resin film containing fine particles of hexaboride, and ITO or ATO particles. The films are employed in order to provide windows, e.g. in vehicles or buildings which shield from transmission of heat but permit transmission of visible light (paragraph [0001]).

According to example 1 of E2a particles of lanthanum hexaboride are combined with a polycarbonate to form a heat ray shielding polycarbonate film. The  $\text{LaB}_6$  is present in an amount of 0.00097 wt % based on the film which, considering that the principal component (matrix) is polycarbonate, corresponds to an amount

within the range specified in operative claim 1.

#### 1.7.2 The distinguishing feature

The nature of the polycarbonate employed in example 1 of E2a is not specified. However according to paragraph [0036] of E2a it appears that aromatic polycarbonates are preferred. There is consensus between the parties that the polycarbonate exemplified was aromatic and the board has no reason to take a different position. However the content of hydroxyl groups is not defined either in the example, nor is there any indication of this property of the polycarbonates in paragraph [0036] of E2a or indeed elsewhere in the document. As a consequence the subject-matter of claim 1 of the main request is distinguished from the disclosure of example 1 of E2a by the specified hydroxyl group content of the polycarbonate.

#### 1.7.3 The technical effect

It is correct, as submitted by the appellant, that there is no example which corresponds directly to the disclosure of E2a. However since E2a fails to disclose the content of hydroxyl groups it is objectively impossible to provide such a direct comparison. Nevertheless the patent provides examples having contents of hydroxyl groups both inside and outside the claimed range. Thus Example 2 and Reference Example 3 both relate to polycarbonates prepared by transesterification whereby PC-1 as employed in Example 2 has a hydroxyl group content of 1000 ppm - inside the claimed range - and PC-2 employed in Reference Example 3 has a hydroxyl group content of 150 ppm and hence outside the claimed range. The compositions shown in these examples are in all other respects identical,

i.e. the only difference is the hydroxyl group content of the polycarbonate. These examples shows that the composition of Example 2 has a haze of 1.0% whereas the composition of Reference Example 3 exhibits a haze of 2.1%. Other optical properties, namely ratio of total light transmittance/solar transmittance and the hue (L, a and b values) are approximately the same in both examples. No other example pair is suitable to provide a reliable comparison because different methods have been employed to prepare the polycarbonates (either transesterification or interfacial polymerisation).

Regarding the question of whether the effect can be seen as being obtained over the entire scope of the claim and the role of the content of heterogenous structural units in the polymer, this objection was raised at a very advanced stage of the proceedings, i.e. during the oral proceedings before the Board. The respondent was nevertheless in a position to deal with this as evidenced by the arguments advanced. Furthermore no formal request was made to disregard this new line of argument. Accordingly the board can see no reason to exercise its discretion to exclude this newly presented line of argument from the procedure. The matter will consequently be dealt with in the following.

With respect to the influence of the content of heterogenous units, as discussed in paragraph [0017] of the patent the content of such units is preferably between 0.01 and 1 mol%, lower values being stated to give rise to poor haze and higher values to the risk of gelation. However this passage is presented in the form of a speculative, "presumed" explanation of the observation that polycarbonates produced by transesterification exhibit good haze values.

The appellant referred in particular to Reference Examples 3 and 4 of the patent. These differ from each other only in the nature of the polycarbonate. Reference Examples 3 and 4 employ, respectively, polycarbonates PC-2 prepared by transesterification and PC-3 prepared by interfacial polymerisation. Both polycarbonates have the same content of hydroxyl groups (150ppm) but different contents of heterogenous units (0.35 mol% and 0 mol% respectively). The respective haze values are 2.1% and 2.6%.

The difference in haze of these two compositions is only 0.5 percentage units whereas the difference between the aforementioned Example 2 (1000 ppm hydroxyl groups and Reference Example 3 (150 ppm hydroxyl groups) was 1.1% units, i.e. more than twice as much as the difference arising from the content of heterogenous units. This dominant influence of the hydroxyl group content on haze is confirmed by inspection of the content of heterogeneous groups in the polycarbonates of Example 2 and Reference Example 3 which are similar. The polycarbonate employed in Example 2 has a content of heterogenous groups of 0.30 mol%, compared to 0.35 mol% for the polycarbonate PC-2 used in Reference Example 3. Despite this similarity in the content of heterogenous units the composition based on PC-1 having a hydroxyl content within the claimed range had a significantly lower haze than did the composition based on PC-2.

The evidence of these examples is that if - as postulated in the patent - the content of heterogenous units does exert some influence on the haze this is minor compared to the strong influence demonstrated to arise from the content of hydroxyl groups. Thus the

restriction of the hydroxyl groups content as defined in the claim has been shown to be both necessary and sufficient to give rise to the technical effect of reduced haze. There is furthermore no evidence that the content of heterogenous units is critical or dominant to the extent that even in the case of a composition satisfying the requirement of the hydroxyl group content a satisfactory haze would nevertheless not be obtained if the group of heterogeneous units was outside the range indicated in the description.

In view of the available examples and in the absence of any contradictory evidence it is credible that the technical effect of reduced haze is obtained over the entire scope of the claims.

#### 1.7.4 The objective technical problem

In view of the foregoing the objective technical problem to be solved compared to closest prior art E2a can be formulated as the provision of polycarbonate materials having hexaboride particles exhibiting low haze.

#### 1.7.5 Obviousness

E2a itself addresses the matters of solar transmittance and the balance between transmittance of visible light and solar radiation as set out in paragraph [0008] of the document. Haze is not addressed, nor is any significance attached to the nature of the polycarbonate, in particular the content of hydroxyl groups.

E5 relates according to claim 1 to an aromatic polycarbonate which is defined by the molecular weight,



the value of Mw/Mn and the content of branched units. The content of hydroxyl units is not part of the definition of the product. According to the first paragraph of E5 the polycarbonates are intended for use as extruded, injection moulded and blow moulded products, for example sheets. Glazing is not disclosed as an end use of the materials.

E5 does not address the technical problem common to the patent in suit and E2a, i.e. glazing with differentiated transmittance of solar and visible radiation meaning that there is, *prima facie* no reason to consult this document when seeking to provide heat shielding glazing materials containing hexaboride pigments and having low haze.

In paragraph [0046] of E5 it is taught that the content of terminal hydroxyl groups influences the thermal stability, hydrolytic resistance, hue and undefined "other properties". It is further taught that the content of terminal hydroxyl groups should be maintained in the range of 100-1500 ppm. According to the examples and as explained in paragraphs [0118] and [0119] of E5, the hydrolytic resistance is assessed by subjecting an injection moulded sample to water vapour at 120°C for 50 hours, i.e. an accelerated ageing test and then assessing the haze as a measure of the extent of hydrolytic stability. Thus insofar as there is any link in E5 between the content of hydroxyl groups and haze this is restricted to the measurement of hydrolytic stability, but not to the haze of the materials "as formed".

Example 10 of E5 demonstrates a polycarbonate having a hydroxyl group content of 500ppm and thus within the range specified by the operative claims. This example

exhibits the highest haze of all examples - both prior to and subsequent to the water vapour treatment (6% and 27% respectively). However, significantly, this sample contains Ultramarine pigment, i.e. a particulate material. All other examples of E5 employ a dye as colorant. In particular example 9, which appears, based on the polymer properties reported, to relate to the same polycarbonate as employed in example 10 contains a dye and shows significantly lower haze values of 1% and 3% before/after hydrolysis.

The significance of examples 9 and 10 is that they appear to demonstrate that incorporation of a pigment into a polycarbonate having a hydroxyl group content within the range required by operative claim 1 will result in a material with poor haze even before the hydrolytic treatment.

As explained above, the examples of the patent however show a different result. Although a pigment is present, namely the hexaboride, good haze values are obtained.

Example 10 of E5 therefore suggests that it is not possible to obtain a composition of polycarbonate and a pigment exhibiting low haze meaning that even if the skilled person, in seeking a solution to the objective problem with respect to E2a, were to consult E5, there would be no suggestion as to how haze of pigmented compositions could be reduced or even if this were possible.

Consequently the claimed solution to the problem, consisting in employing a polycarbonate of defined terminal hydroxyl group content in order to obtain hexaboride containing polycarbonate compositions of low haze, does not emerge in an obvious manner - if at all

- from the combination of teachings of E2a and E5.

No different conclusion would be arrived at if starting from E3 as the closest prior art as has been conceded by the appellant.

E4 was also invoked by the appellant in combination with E2a/E3. E4 is directed to a method for recycling polycarbonate (abstract). Hydroxyl group content is discussed on page 5, lines 10-18 in the context of the starting polycarbonate for the process, the preferred range being 400-1000 ppm. Although among the possible end uses of the resulting polycarbonates as discussed, starting at the bottom of page 10 of E4, various applications which can be considered to fall within the ambit of glazing are mentioned, for example safety sheets as employed in buildings and vehicles, shields for helmets, light transmitting sheets for example for use as roofing in buildings such as stations and greenhouses, there is no discussion of the specific problem as addressed by the patent in suit or of the influence of the hydroxyl group content of the polycarbonate on the haze of a pigmented composition. Consequently even if - the lack of *prima facie* relevance notwithstanding - the skilled person had consulted E4, no guidance to the subject-matter now claimed would be derived in respect of addressing the objective technical problem. Consequently the subject-matter as claimed is not rendered obvious by the combination of E2a/E3 and E4.

This conclusion applies to all claims since all relate to the composition of claim 1.

1.8 Late filed documents E8-E12 - admittance to the procedure.

The justification for submitting E8-E12 with the statement of grounds of appeal was that it was only in the course of the oral proceedings before the opposition division that it became apparent how the technical problem to be solved was seen by the division. The appellant conceded that although this possibility had been taken into consideration in preparing the case, it had been assumed that the other documents submitted would have been sufficient to demonstrate lack of an inventive step.

The first of these arguments is manifestly incorrect since the same formulation of the technical problem is to be found on page 9, second from last complete paragraph of the communication of the opposition division pursuant to Rule 116(1) EPC and in paragraph 8.3 of the grounds for the decision. Consequently it was apparent prior to the oral proceedings how the opposition division viewed the technical problem to be solved, meaning that such documents could have been submitted at an earlier stage.

The second statement of the appellant, confirming that the approach represented by submission of E8-E12 had indeed been taken into consideration during the opposition procedure confirms that the documents could - and should - have been submitted during the opposition proceedings, but that it was elected not to do so.

Under these circumstances, the board considers it appropriate to exercise its discretion pursuant to Article 12(4) RPBA not to admit documents E8-E12 to the procedure.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated