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**Datasheet for the decision  
of 6 July 2021**

**Case Number:** T 2349/17 - 3.3.03

**Application Number:** 02777112.0

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**Language of the proceedings:** EN

**Title of invention:**

TRANSPARENT POLYESTER RESINS AND ARTICLES THEREFROM

**Patent Proprietor:**

APG Polytech, LLC

**Opponents:**

Invista Technologies S.à r.l.  
Mitsubishi Gas Chemical Company, Inc.

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step - (no)



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Case Number: T 2349/17 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 6 July 2021**

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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
14 August 2017 concerning maintenance of the  
European Patent No. 1432762 in amended form.**

**Composition of the Board:**

**Chairman**            D. Semino  
**Members:**            O. Dury  
                              C. Brandt

## **Summary of Facts and Submissions**

- I. The appeal by opponent 1 lies against the interlocutory decision of the opposition division posted on 14 August 2017 concerning maintenance of European patent number 1 432 762 in amended form according to the claims of the main request filed with letter of 12 May 2017 and an adapted description.
- II. A notice of opposition was filed, in which the revocation of the patent in its entirety was requested.
- III. The main request dealt with in the decision under appeal corresponds to the main request dealt with in decision T 422/13 of 15 June 2016, which was filed as auxiliary request 5A during the oral proceedings before the Board on 15 June 2016 (same Board as in the present case but in a different composition). According to that decision, said main request satisfied the requirements of Articles 84 and 123(2) EPC and of sufficiency of disclosure and the case was remitted to the department of first instance for further prosecution on the basis of that main request.
- IV. Claim 1 of the main request dealt with in the decision under appeal read as follows:
- "1. Compositions usable for preparing articles having high transparency comprising an aromatic polyester resin and a polyxylylene amide, in which the polyester resin is selected from the copolyalkylene terephthalates containing from 3 to 15 % by mols of units derived from isophthalic acid and/or naphthalene dicarboxylic acids, the melt viscosity ratio between the copolyalkylene terephthalate and the polyamide is

higher than 1.5:1, and the polyamide is dispersed in the polyester resin matrix as domains having average numeral size from 80 to 100 nm, and wherein the polyxylylene amide is poly (m. xylylene adipamide) used in amount of 1 to 15% by weight relative to the polyester resin, and wherein the compositions are obtainable by pre-melt mixing the polyester resin with a dianhydride of a tetracarboxylic acid and subsequently adding and mixing the polyxylylene amide under shear conditions suitable to obtain a fine and stable dispersion of the polyamide in the polyester matrix, wherein the mixing of the polyester resin, pre melt-mixed with the dianhydride, and the polyxylylene amide is carried out in an extruder by melt-mixing at shear rates higher than  $100 \text{ s}^{-1}$ , and wherein more than 80% of the domains have size of 80 to 110 nm".

V. The following documents were cited among others in the decision under appeal:

D1: EP 0 964 031 B1

D27: Y. Maruhashi and S. Iida, Transparency of Polymer Blends, Polymer Engineering and Science, November 2001, Vol. 41, No. 11, pages 1987-1995

D36: Polymer Blends, edited by D. R. Paul and S. Newman, Vol. 1, Academic Press, New York, 1978; ISBN 0-12-546801-6; Chapter 5, pages 185-242

VI. In the decision under appeal the opposition division *inter alia* held that the subject-matter of claim 1 of the main request was inventive starting from D1 as closest prior art either alone or in combination with common general knowledge as represented by D36 and/or

D27 (section 4.2 of the reasons).

- VII. Together with its statement of grounds of appeal opponent 1 (appellant) requested that the opposition division's decision be set aside and the patent be revoked.
- VIII. With its rejoinder to the statement of grounds of appeal, the patent proprietor (respondent) requested that the appeal be deemed not to have been filed or, in the alternative, that the appeal be dismissed.
- IX. Opponent 2 (party to the proceedings as of right), did not make any submissions or filed any requests during the appeal proceedings.
- X. The parties were summoned to oral proceedings and a communication was sent by the Board in which the issues to be discussed at the oral proceedings were identified. It was in particular indicated therein that it appeared that the respondent's request that the appeal should be deemed not to have been filed was to be rejected.
- XI. With letter of 29 April 2021, the Board indicated to the parties that it had been informed by the former representatives of opponent 2 that they were no longer mandated in this matter and pointed to the stipulations of Article 133 (2) and (3) EPC regarding the representation of parties. No reaction from opponent 2 to that communication took place.
- XII. Oral proceedings were held in Munich on 6 July 2021 in the presence of the appellant and the respondent. Although duly summoned, no one appeared for the party as of right. At the beginning of the oral proceedings

the respondent withdrew its objection that the appeal be deemed not to have been filed.

XIII. The appellant's arguments, insofar as relevant to the present decision and the operative main request, may be summarised as follows:

(a) D1, which was a suitable document to be taken as the closest prior art, disclosed most of the technical features of operative claim 1 but did not explicitly disclose that the polyamide was dispersed in the polyester resin matrix as domains having average numeral size of 80 to 100 nm, and wherein more than 80% of the domains had size of 80 to 110 nm. Rather, D1 disclosed that the domain sizes were in the range of less than 1000 nm, with specific examples of less than 500 nm. D1 further did not recite the shear rate at which the polyester resin (pre melt-mixed with the dianhydride) and the polyamide were mixed in its examples. At the oral proceedings before the Board, examples 1 and 2 of D1 were identified as particularly relevant since they only differed from the subject-matter of operative claim 1 in that no explicit information was provided regarding the average numeral size and size distribution of the polyamide domains, the melt viscosity ratio and the shear rate. Regarding the latter, the product-by-process feature of operative claim 1 "shear rate higher than  $100 \text{ s}^{-1}$ " had not been shown to have any technical effect or to result in any inevitable result that distinguished the claimed composition from the subject matter of D1. Therefore, that feature did not constitute any distinction over D1.

- (b) None of the examples of the patent in suit actually illustrated the subject-matter being claimed. In addition, these examples could not be fairly compared and there was no evidence on file in support of an effect obtained in relation to the above identified distinguishing features. At the oral proceedings before the Board it was in particular agreed that the domain sizes measured on different articles in the examples did not allow a fair comparison. Whereas it was not contested in the statement of grounds of appeal that the objective problem solved over D1 resided in the provision of compositions with improved transparency (section 53), it was held at the oral proceedings before the Board that in the absence of a fair comparison with the closest prior art, the objective problem could only reside in the provision of an alternative composition.
- (c) Regarding obviousness, basic physics taught that smaller domains or particles scattered light to a smaller extent and therefore generated less haziness i.e. led to increased transparency. That common general knowledge was further explained in D36. The fact that D36 was not specifically directed to copolyester/polyamide MXD6 blends as in D1 or the patent in suit did not play a role since the information of D36 represented the skilled person's understanding for blends of incompatible polymers. In addition, the range of domain sizes from 80 to 100 nm specified in operative claim 1 had not been shown to be related to any effect and was, thus, arbitrary. The same was valid regarding the specific domain size distribution mentioned in operative claim 1.

The most general teaching of D1 was for domain sizes of less than 1  $\mu\text{m}$ , which encompassed domain sizes of 80 to 100 nm as specified in operative claim 1. The fact that D1 disclosed a preferred range of domain size of 200 to 400 nm did not mean that smaller domain sizes should be avoided. In other words, D1 did not teach against or away from using domain sizes as defined in operative claim 1.

Even if the compositions of D1 were to be transparent, as argued by the respondent, the skilled person would always aim at improving these compositions. In that respect, contrary to the respondent's view, Figure 15 of D27 did not show that compositions in which the polyamide domains were smaller than 200 nm exhibited no haze and did not need to be improved.

The fact that small domain sizes might lead to a worsening of impact strength was irrelevant since impact strength did not make part of the problem effectively solved over D1.

Under these circumstances, it was obvious for the skilled person aiming at improving the transparency of the compositions of D1 to reduce the domain sizes of the compositions according to example 1 of D1, in particular in the range as defined in operative claim 1.

- (d) In order to achieve smaller domain sizes, it was known in the art, as indicated in D27, to apply a more vigorous mixing of the polymer blends, e.g. by increasing the shear rate in the extruder.

It was further also derivable from D27 that smaller

domain sizes might be obtained by increasing the melt viscosity ratio between the copolyester and the polyamide. Therefore, in order to reduce the polyamide domain size of the composition according to example 1 of D1, the skilled person was taught by D27 to work in the higher end of the melt viscosity ratio disclosed in D1.

Although D27 did not disclose domain sizes as small as defined in operative claim 1, it taught that increasing shear rate and/or increasing the melt viscosity ratio defined in operative claim 1 led to a smaller size of the polyamide domains. Applying that teaching to the compositions of D1 would lead to the subject-matter of operative claim 1.

- (e) For these reasons, it was obvious to improve the transparency of the composition according to example 1 of D1 by working in the higher end of the range of melt viscosity ratio taught in D1 and by using shear rates higher than  $100 \text{ s}^{-1}$ .
- (f) In view of the above, the subject-matter of claim 1 of the main request was not inventive starting from D1 as the closest prior art.

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

- (a) D1 was a suitable document to be taken as the closest prior art.
- (b) However, although D1 disclosed some of the technical features of operative claim 1, the appellant did not explain where the specific combination of these features was disclosed in D1.

Even if examples 1 or 2 of D1 were considered, the subject-matter of operative claim 1 differed therefrom in requiring the recited polyamide domain sizes and the distribution thereof. Although it had been argued in writing that D1 failed to disclose the recited melt viscosity ratio of the polyester to the polyamide and the step of melt-mixing polyester/polyamide at shear rates higher than  $100 \text{ s}^{-1}$  in an extruder, it was acknowledged at the oral proceedings before the Board in reply to a question of the Chairman that these features did not imply any additional limitation as compared to the product defined in operative claim 1 without said feature(s), but were linked to the domain sizes and the size distribution.

- (c) The comparison of example 1 with comparative example 1 or of example 1 with example 3 of the patent in suit showed that the problem effectively solved over D1 was to provide compositions exhibiting improved transparency/reduced haze. Questioned by the Board, it was acknowledged at the oral proceedings that whereas the determination of the domain sizes was made on an injection moulded bar in example 1, it was made in comparative example 1 and in example 3 - according to the information given in the patent in suit - on films as indicated in paragraphs 14 and 15 of the patent in suit. At the oral proceedings before the Board it was pointed out that it was explicitly stated in the patent in suit that example 1 only differed from comparative example 1 in that a polyamide MXD6 having a different relative viscosity was used, contrary to the appellant's allegations during the oral

proceedings. The fact that example 3 was carried out with more PMDA than in example 1 was not relevant for the above conclusion. Contrary to the appellant's view, at least example 3 of the patent in suit illustrated the subject-matter of operative claim 1, whereby the comonomer content of the copolyester of 2.2 wt.% amounted to 2.54 mol.%, which, when rounded up, amounted to 3 mol.% as defined in operative claim 1.

- (d) Regarding obviousness, in order to arrive at the subject-matter being claimed, the appellant combined various isolated passages of D1, which was based on hindsight.

In addition, none of the documents cited taught to use melt viscosity ratio together with shear rates as defined in operative claim 1 in order to arrive at the domain sizes and domain size distribution defined therein. In that respect, D36 was not related to polymer blends according to D1 or the patent in suit. In addition, it was published much earlier than D1 or the patent in suit. Therefore, D36 did not represent common general knowledge in the present technical field, in particular not at the relevant point in time. For that reason, the skilled person would not consider D36.

In any case, the appellant failed to explain why the skilled person would select the domain sizes as defined in operative claim 1 and how he would be able to prepare the compositions so being defined on the basis of the prior art. In that respect, D36 - should it be held to be relevant - in particular did not recommend working with domain sizes of 80 to 100 nm. Also, in view of the preferred range of

domain size of 200 to 400 nm indicated in D1, the skilled person would have no motivation to work with a range of 80 to 100 nm as defined in operative claim 1. In particular, considering that D1 disclosed that the articles prepared therein were already transparent, the skilled person would have no reason to aim at improving transparency. In view of D1 itself, there was no need to decrease the size of the polyamide domains. This was all the more true in view of Figure 15 of D27, which showed that haze was not a problem for domain sizes below 200 nm. It was further known in the art, e.g. from D36, that reducing the domain sizes led to a decrease in impact strength. Considering that D1 aimed at providing good impact strength, the skilled person would not be motivated to decrease the domain sizes.

(e) Even if the skilled person wanted to reduce the domain sizes, he would not have known how to achieve the specific range of average domain size and size distribution specified in operative claim 1. In that respect, D27 neither disclosed domain sizes nor the specific distribution specified in operative claim 1.

(f) For these reasons, the subject-matter of claim 1 of the main request was inventive starting from D1 as closest prior art.

XV. The appellant requested that the decision of the opposition division be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed.

The party as of right did not make any requests.

## Reasons for the Decision

1. Article 56 EPC
  - 1.1 Closest prior art
    - 1.1.1 The opposition division's conclusion according to which D1 constituted a suitable document to be taken as the closest prior art is not contested by the parties.
    - 1.1.2 During the oral proceedings before the Board, both parties agreed that example 1 of D1 read in combination with paragraph 30 of D1, which refers to the determination of the size of the polyamide domains in a bar made of the composition prepared in example 1 thereof, constituted a suitable starting point for the assessment of inventive step. The Board has no reason to deviate from that view.
  - 1.2 Distinguishing feature(s)
    - 1.2.1 Paragraph 30 and example 1 of D1 read as follows:

**[0030]** Operating under the above conditions it is possible to obtain compositions wherein the polyamide is dispersed in the polyester matrix with domains having size of less than 1 micron, preferably in the range from 0.2 to 0.4 micron. The microstructure was obtained by scanning electron microscope (S.E.M.) of the fracture surface of injection molded small bars treated with formic acid to extract the polyamide. The bars obtained according to example 1 have a microstructure wherein the dispersed phase has a size of less than 0.5 micron. The size of the domains in the bars obtained from example 1 but without using PMDA are higher than 1.5 micron as average. The microstructure according to the invention is characteristic in particular of the blends of poly MXD-6 with PET or copolyethylene terephthalates containing up to 25% of units deriving from isophthalic acid.

EXAMPLE 1

**[0047]** 20 kg/h of crystallized granules of copolyethylene terephthalate (COPET) containing 4.5% isophthalic acid (IPA) with IV = 0.6 dl/g (predried at 140°C in vacuum for at least 12 h) are fed together with 20 g/h of pyromellitic dianhydride (PMDA) (0.1% by weight on the COPET) in a twin-screw extruder with contrarotating and intermeshing screws and then pelletized.

**[0048]** The operating conditions are:

Screw rotation rate: 100 rpm  
Cylinder temperature: 280°C throughout the cylinder  
COPET feed: 20 kg/h  
PMDA feed: 20 g/h  
Residence time: 1.5 min

**[0049]** The resulting pellets were crystallized at 130°C in a reactor in continuous under nitrogen flow.

**[0050]** IV after extrusion was 0.61 dl/g.

**[0051]** 20 kg/h of crystallized COPET containing 0.1% PMDA obtained as mentioned above are fed into a twin-screw extruder provided with contrarotating and intermeshing screws together with 2.2 kg/h of poly-MXD-6 (Mitsubishi Gas Chemical - MGC - Japan) having a viscosity in the molten state at 280°C and 100 sec<sup>-1</sup> of shear rate of 1000 PAS and pelletized.

**[0052]** The conditions for preparing the mixture are the same used for the treatment of COPET with the addition of PMDA.

1.2.2 Regarding the identification of the features distinguishing the subject-matter of operative claim 1 from the compositions prepared in example 1 of D1, the compositions defined in operative claim 1 are defined both in terms of features related to the (starting) components used to prepare the compositions (polyester; polyxylylene amide) and to the (end) composition prepared therefrom (characterised in terms of domain sizes of the polyamide dispersed in the pre melt-mixed polyester resin matrix). Those compositions are further defined as being "usable for preparing articles having high transparency" and in terms of a product-by-process feature ("obtainable by") directed to an extrusion process.

1.2.3 Regarding the reading of operative claim 1, the Board fully endorses the conclusions reached in section 2 of decision T 422/13, which may be summarised as follows:

- The compositions being claimed are directed to the products in a solid state such as those obtained at the exit of the extruder and consisting of a solid

polyester matrix containing dispersed polyamide domains also in a solid form, whereby the stability feature ("to obtain a ... stable dispersion") mentioned in claim 1 is the direct and inevitable consequence of the matrix and the dispersed phases being in the solid state i.e. it is an inherent feature of the compositions as defined in claim 1;

- The melt viscosity ratio specified in claim 1 is defined on the basis of the neat copolyester (and not of its reaction product with a dianhydride of a tetracarboxylic acid).

That reading of operative claim 1, which was communicated to the parties in the Board's communication (section 6.2.2), was not disputed.

- 1.2.4 It was also undisputed that the subject-matter of operative claim 1 at least differs from the composition prepared in example 1/paragraph 30 of D1 in that it requires the polyamide to be dispersed in the polyester resin matrix as domains having average numerical size of 80 to 100 nm and wherein more than 80% of the domains have size of 80 to 110 nm. Indeed, these features are neither explicitly disclosed in D1, nor is any information in that respect present on file. It may only be derived from paragraph 30 of D1 that the dispersed polyamide domains in the bars prepared from the composition according to example 1 of D1 had a size of less than 500 nm, which would be understood by the skilled person to imply that these domains had an average numeral size larger than 100 nm, i.e. these domains were larger than as defined in operative claim 1. That conclusion was not disputed, in particular not by the appellant at the oral proceedings

before the Board.

1.2.5 Although operative claim 1 is defined using a product-by-process formulation ("obtainable by"), its subject-matter is the composition *per se*. In that respect, the product-by-process feature "obtainable by pre melt-mixing ... at shear rates higher than  $100 \text{ s}^{-1}$ " was not shown to imply any additional limitation to the product itself as compared to the product defined in operative claim 1 without said feature, as put forward by the appellant (sections 56-57 of the statement of grounds of appeal). In particular, no evidence in that respect was provided by the respondent although that issue was identified in the Board's communication (section 6.2.3: first paragraph). Under these circumstances, that product-by-process feature may only be seen as corresponding to the preparation conditions of the composition being claimed, which are necessary in order to obtain the domain sizes and domain size distribution features which are also specified in operative claim 1. That reading was not contested by the parties at the oral proceedings before the Board.

1.2.6 Similarly, the melt viscosity ratio between the copolyalkylene terephthalate and the polyamide specified in operative claim 1 was not shown to additionally characterise the subject-matter being claimed as compared to the product defined in operative claim 1 without said feature (see also section 6.2.3 of the Board's communication: first paragraph). Therefore, for the same reasons as for the shear rate feature (section 1.2.5), it can only be held to correspond to a preparation condition of the composition being claimed, which is necessary in order to obtain the domain size and domain size distribution features which are also specified in operative claim 1. That reading also was

not contested by the parties at the oral proceedings before the Board.

1.2.7 In view of the above, the subject-matter of operative claim 1 differs from the composition prepared in example 1 and referred to in paragraph 30 of D1 in the following features:

- the polyamide is dispersed in the polyester resin matrix as domains having average numeral size from 80 to 100 nm;
- more than 80% of the (polyamide) domains have size of 80 to 110 nm (that feature is referred to as the the domain distribution hereinafter, as was done by the parties e.g. during the oral proceedings before the Board).

1.3 Problem effectively solved over the closest prior art

1.3.1 During the oral proceedings before the Board, the respondent argued that the problem effectively solved over D1 resided in the provision of a composition having improved transparency/reduced haze. In its view, the comparison of example 1 with comparative example 1 or of example 1 with example 3 of the patent in suit showed that that problem was indeed solved.

1.3.2 However, in order to be considered in the formulation of the problem effectively solved over the closest prior art an advantageous effect should be shown to be attributable to a feature distinguishing the claimed subject-matter from the closest prior art, here either the average numeral size and/or the distribution of the polyamide domains.

a) It was undisputed that no comparison between a composition according to operative claim 1 with a composition according to example 1 of D1 is on file.

Regarding the examples of the patent in suit, it was undisputed, in particular at the oral proceedings before the Board, that according to the patent in suit the domain sizes could be either determined on a cast film (paragraphs 14-15 of the patent in suit) or on a "small bar obtained by injection molding" (paragraph 41 of the patent in suit). In that respect, it was clarified at the oral proceedings before the Board that in view of the information provided in the patent in suit, the skilled person would understand that the domain sizes were measured either on an injection moulded bar in example 1 of D1 or on a cast film in comparative example 1 and in example 3 of the patent in suit. However, no evidence was provided to show that the domain sizes determined on a cast film and on a "small bar obtained by injection molding" may be fairly compared, although that issue was identified in the Board's communication (section 6.3.1.b, last sentence of the last sub-section; see also the issue addressed in section 6.1.2 of said communication, wherein it was indicated that a specific domain size and distribution thereof appeared to be associated with the specific article on which it is determined). Under these circumstances, it cannot be concluded that the examples of the patent in suit allow a fair comparison in respect of any of the distinguishing features identified in section 1.2.7 above.

Therefore, at least for that reason, no fair comparison may be made between the examples of the patent in suit relied upon by the respondent to show that the above identified distinguishing features are related to a

technical effect.

b) In addition, in the absence of any information whether or not the domain size distribution feature according to operative claim 1 is satisfied in example 1 of the patent in suit, it cannot be concluded that said example 1 illustrates the subject-matter being claimed and demonstrates the achievement of an improvement in haze of the subject-matter being claimed over the closest prior art (as put forward by the respondent in view of the comparison of example 1 with comparative example 1 of the patent in suit). Also, since example 3 of the patent in suit differs from example 1 of the patent in suit at least in that a different amount of PMDA was used, examples 1 and 3 of the patent in suit do not differ solely in (at least one of) the above identified distinguishing feature(s). Therefore, the comparison of these examples of the patent in suit also cannot support an improvement related to any of these features.

1.3.3 Nevertheless, it is noted that the appellant did not dispute in its statement of grounds of appeal that it was credible that the problem formulated by the respondent was indeed solved (section 53 of the statement of grounds of appeal).

In that respect, it is in the Board's view credible, in particular in the light of the disclosures of D27 and D36, that decreasing the size of the dispersed polyamide domains in the copolyester matrix in example 1/paragraph 30 of D1 would lead to higher transparency/reduced haze. Indeed, this is what the skilled person would expect from the indication given in D27 that, in particular in PET/MXD6 polyamide blends, haze increases with the size of the dispersed

domains (abstract: "The reason for this haze is the number and size of the dispersed particles"; page 1993, left hand side column above Figure 15: "However, haze naturally becomes higher in blends with larger dispersed particles ..."; page 1994, section Conclusion: "The degree of haze ... depends on the size of the dispersed particles"). Similarly, it is derivable from pages 186-187 of D36 that it is generally accepted that the clarity of blends of incompatible polymers may be improved by reducing the domain sizes of the dispersed phase, whereby the critical size for transparency is approximately 0.1 micron (bottom of page 186). Although D36 is not specifically directed at (co)polyester/polyamide compositions according to D1, the Board considers that its teaching reflects common general knowledge regarding blends of incompatible polymers, which is the case of the polymer blend prepared in example 1 of D1. The fact that the appellant's representatives may have argued differently regarding the relationship between domain size and low haze at a different stage of the proceedings, as submitted by the respondent (rejoinder to the statement of grounds of appeal: page 4, third paragraph), is, in the Board's view, not relevant, since the teaching of both D36 and D27 is unambiguous in that respect.

1.3.4 In view of the above, it is accepted that the problem effectively solved over D1 resides in the the provision of a composition having improved transparency/reduced haze.

1.4 Obviousness

1.4.1 The question remains to be answered whether the skilled person, desiring to solve the problem identified as

indicated in section 1.3.4 above, would, in view of the closest prior art, possibly in combination with other prior art or with common general knowledge, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter.

1.4.2 In that respect, two main issues were in dispute between the parties, the first one being whether or not the skilled person would have any motivation to prepare compositions exhibiting the domain sizes and distribution thereof as defined in operative claim 1, the second one being if, should the skilled person be willing to prepare such compositions, he would have been able to do so on the basis of the teaching of the cited prior art documents (enablement by the prior art). These two issues are discussed separately hereinafter.

1.4.3 Motivation to prepare compositions as defined in operative claim 1

a) In that respect, D1 itself discloses that compositions are prepared in which the polyamide is dispersed in the polyester matrix with domains having size of less than 1 micron, preferably in the range from 0.2 to 0.4 micron, whereby bars obtained according to example 1 have domains of less than 500 nm (0.5 micron; see paragraph 30).

Therefore, since it is generally accepted (see section 1.3.3 above, which is equally relevant here) that for blends of incompatible polymers such as the ones used in example 1 of D1 the transparency may be improved by reducing the domain sizes of the dispersed phase, the skilled person would have a good reason for aiming at reducing and controlling the domain sizes

taught in paragraph 30 for the composition prepared according to example 1/paragraph 30 of D1.

b) The respondent put forward that the skilled person would have had no motivation to improve the transparency/reduce the haze of the compositions prepared according to example 1 of D1 because D1 taught that the articles made therefrom already exhibited a high clarity (paragraph 43 of D1). The same was valid in view of Figure 15 of D27, so the respondent.

However, no evidence is on file regarding the clarity/haze level of the composition prepared according to example 1 of D1. In that respect, it is agreed with the appellant that "high clarity" as disclosed in D1 is not an absolute and unambiguous requirement. Therefore, there is no reason to expect that the skilled person would have no reason to try to further improve the clarity/reduce the haze of the composition prepared in example 1 of D1.

In Figure 15 of D27, incompatible polymer blends in which the domains of the dispersed phase in the matrix are between 100 and about 200 nm (empty dots) are indicated to exhibit a haze of 0-25 %. However, these data do not allow to conclude that said compositions could not be improved in respect of haze/transparency, as put forward by the respondent. In particular, it makes no doubt that the skilled person, considering that such compositions may exhibit a haze of up to 25 %, would not have been deterred from trying to further improve the transparency/reduce the haze of these compositions.

For these reasons, the respondent's arguments did not convince.

c) The respondent argued that the skilled person would not be motivated to decrease the domain sizes taught in D1 because it was derivable from D36 that it would lead to a decrease in terms of impact strength (reply to the statement of grounds of appeal: page 6, first four paragraphs). However, considering that the impact strength does not make part of the problem effectively solved over D1, that argument is rejected.

d) In view of the above, it is concluded that the skilled person would have had good reasons to decrease and control the size of the dispersed polyamide domains in the composition according to example 1/paragraph 30 of D1.

1.4.4 Teaching in the prior art how to prepare such dispersions (enablement by the prior art)

a) In that respect, D1 contains no specific teaching how to obtain domain sizes as defined in operative claim 1 or how to reduce and/or control the domain size distribution.

b) However, it is derivable from D27 that it was known in the art that smaller sizes of the dispersed phase domains may be obtained by increasing the shear rate during melt mixing (page 1990: right column, paragraph above Figure 8; Figure 13). In that respect, screw speeds of 200 rpm and 400 rpm are explicitly taught in D27 (page 1992: paragraph above Figure 12; Figure 13), whereby the fact that such screw speeds amounted to shear rates of more than  $100 \text{ s}^{-1}$  (it was in particular put forward at the oral proceedings before the Board that this was derivable from D27: page 1992, paragraphs above Figure 12), was not contested. It was also

undisputed that shear rates of higher than  $100 \text{ s}^{-1}$  were usual in the art (statement of grounds of appeal: section 61).

In addition, D27 also teaches that smaller dispersed phase domains may be obtained by increasing the viscosity ratio polyester/polyamide up to a value of about 3-4 (Figure 14, taking into account that the viscosity ratio "p" of D27 is the inverse of the viscosity ratio defined in operative claim 1 - see D27: page 1991, right hand side column, first paragraph and page 1994: third sentence of the section "Conclusion").

Therefore, on the basis of D27, the skilled person aiming at reducing the domain sizes of the composition according to example 1/paragraph 30 of D1 would contemplate working with shear rates higher than  $100 \text{ s}^{-1}$  and with a melt viscosity ratio polyester/polyamide higher than 1.5, in particular in the higher end of the range of up to 4:1 taught in D1 (paragraph 29).

d) In doing so, it can only be concluded that, following the teaching of the patent in suit itself (which uses the same preparation process as in D1, namely a premix of polyethylene terephthalate and the anhydride, followed by a comixing with the polyamide) and in the absence of any evidence to the contrary, the skilled person would inevitably achieve the domain sizes and distribution thereof specified in operative claim 1. In that respect, in the absence of any effect related to either the specific limits of the domain sizes (nothing has been shown to be specific of the values 80 and 100 nm as opposed to values smaller than in D1, but outside that range) or the distribution thereof as indicated in operative claim 1, these

features can only be held to constitute arbitrary requirements, as argued by the appellant (see paragraphs 33-35 of the statement of grounds of appeal).

e) The respondent argued that D27 neither disclosed an average domain size as small as 80 to 100 nm, nor a domain size distribution as defined in claim 1. Therefore, D27 could not lead to the subject-matter being claimed, so the respondent.

Although it is correct that D27 does not disclose the features of operative claim 1 relied upon by the respondent, in particular no domain sizes smaller than 100 nm (see e.g. Figures 11 to 15), D27 is not related to exactly the same components as the ones defined in operative claim 1 and the ones used in example 1 of D1. Indeed, the matrix is polyethylene terephthalate and not a copolymer thereof and no use is made in D27 of a dianhydride component. It remains however that the blends used in D27 and in D1 are made of very similar polymer components so that the skilled person would readily contemplate applying the teaching of D27 to the compositions of example 1 of D1, which was never contested. In addition, it is noted that D27 studied the impact of varying the shear rates and of varying the melt viscosity ratio in two separate experiments (Figures 13 and 14, respectively). Under these circumstances, it is not surprising that different results in terms of domain sizes are obtained in D27 (as compared to the patent in suit). Also, it cannot be excluded that even more noticeable effects would be obtained when combining the two measures taught in D27 simultaneously (as defined in operative claim 1). In doing so, as explained above (preceding section d), it has to be expected that the domain sizes and

distribution thereof specified in operative claim 1 would inevitably be obtained.

- 1.4.5 For these reasons, the skilled person would know from the teaching of D27 how to decrease the size of the polyamide domains in the composition prepared in example 1/paragraph 30 of D1 and to obtain domain sizes and distribution thereof as defined in operative claim 1.
- 1.5 In view of the above, the subject-matter of operative claim 1 is not inventive in view of D1 as the closest prior art and the main request is not allowable.
2. Since the sole request of the respondent is not allowable, the patent is to be revoked.

**Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated