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**Datasheet for the decision
of 29 August 2018**

Case Number: T 1458/16 - 3.3.03

Application Number: 98941706.8

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Title of invention:
POLYESTER RESIN COMPOSITION

Patent Proprietor:
Teijin Fibers Limited

Opponent:
ZIMMER A.G.

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)



Beschwerdekammern

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Case Number: T 1458/16 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 29 August 2018

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 19 April 2016
revoking European patent No. 1016692 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman D. Marquis
Members: M. C. Gordon
C. Brandt

Summary of Facts and Submissions

- I. The appeal lies from the decision of the opposition division posted on 19 April 2016 revoking European patent number 1 016 692.
- II. The patent was granted with a set of 9 claims, whereby claim 1 read as follows:
"A polyester resin composition having an intrinsic viscosity of from 0.4 to 2 and satisfying the following conditions (1) to (4):
(1) poly(trimethylene terephthalate) occupies 90 wt% or more;
(2) a phosphorous compound corresponding to from 10 to 250 ppm in terms of the amount of phosphorous element is contained;
(3) 3 wt% or less of cyclic dimer is contained; and
(4) from 0.4 to 2 wt% or less of bis(3-hydroxypropyl)ether is contained and copolymerized with poly(trimethylene terephthalate)."

Claims 2-7 were directed to preferred embodiments of the polyester resin. Claim 8 was directed to a fibre obtainable from the resin of any one of claims 1 to 7 and claim 9 to a fabric comprising said fibre.

- III. Two notices of opposition against the patent were filed in which revocation of the patent on the grounds of Article 100(a) EPC (lack of novelty, lack of inventive step) and Article 100(c) EPC was requested.

In a first decision of the opposition division, posted 23 March 2007, the patent was revoked on grounds of lack of novelty. Following an appeal (T 831/07, decision dated 17 August 2010) the decision was set

aside and the case remitted to the opposition division for further prosecution.

Following remittal to the opposition division, opponent II (Shell Internationale Research Maatschappij B.V.) withdrew its opposition (letter dated 23 December 2011).

In a second decision of the opposition division the patent was revoked on the grounds of lack of inventive step (Article 56 EPC).

It is this decision which forms the subject of the present appeal proceedings.

- IV. The decision under appeal was taken on the basis of a set of amended claims 1-7 filed with letter of 23 July 2007 as the sole request. This set of claims differed from the claims of the patent as granted in that in claim 1 the following phrase was inserted at the end:
- "[...]poly(trimethylene) terephthalate], wherein the polyester resin composition is obtained by a polycondensation reaction in the presence of a titanium alkoxide catalyst",
- and further in deletion of claims 8 and 9.

The decision held that the subject-matter of the claims met the requirements of clarity, sufficiency, added subject-matter and novelty, which findings have not been challenged on appeal.

The decision held that the subject-matter claimed lacked an inventive step taking into account the teachings of:

D6: Oppermann, W. *et al* Die Angewandte Makromolekulare Chemie **230**, 1995, pages 179-187;

D7: Schauhoff, S. *et al* "New Developments in the production of polytrimethylene terephthalate" in Chemical Fibres International, 1996, pages 263 and 264;

D34: Traub, H.L., PhD Thesis manuscript dated 7 February 1994.

Two features of the claim were held not to be explicitly disclosed in closest prior art D6:

- (3) The content of cyclic dimer (3 wt% or less)
- (4) the content of bis(3-hydroxypropyl)ether (BPE) in the polyester being in the range from 0.4 to 2 wt% or less.

Requirement (3) was considered to be inherently satisfied. This finding, which has been challenged by the appellant, relied on the teaching of D7, which was held to represent general technical knowledge. Regarding feature (4) it was held that insofar as a technical effect was shown to be associated therewith, this effect did not arise over the entire range specified. Furthermore there was an evident contradiction between this feature of the claim and the statement at paragraph [0037], line 29 on page 6 of the patent that a content of 0.4 to 1 wt% of bis-(3-hydroxypropyl) ether groups in the polymer was advantageous. The consequence was that the technical problem had to be formulated as the provision of an alternative composition for fibre spinning, which problem was solved in an obvious manner by the teaching of D6 with reference to that of D34.

V. Accordingly the patent was revoked.

- VI. The appellant (patent proprietor) lodged an appeal against the decision.
- VII. The respondent (opponent) replied.
- VIII. The Board issued a summons to oral proceedings and a communication.
- IX. The parties stated with letters of 16 July 2018 (respondent) and 30 July 2018 (appellant) that the oral proceedings would not be attended.
- X. The arguments of the appellant can be summarised as follows:

D6 was the closest prior art. The subject-matter of claim 1 was distinguished therefrom by conditions (3) and (4).

D6 contained no teaching with respect to cyclic dimer content.

Although D6 indicated that the formation of bis(3-hydroxypropyl)ether group (condition 4 of the operative claim) had to be carefully monitored, and stated that the presence of such groups impaired polymer properties, it was only with respect to incorporation of different moieties, namely diethylene glycol, that D6 reported reduction in specific properties, namely melting temperature and thermal and light stability. D6 also referred to "PET analogues" in this connection.

D6 taught that the amount of bis(3-hydroxypropyl)ether groups in the polymer was at a low level - below 0.1% (page 182, paragraph 6) - and implied that these groups had no influence on the polymer properties. Thus it

appeared that the reference in D6 to the negative effect of bis(3-hydroxypropyl)ether groups on polymer properties was merely the result of speculation, and it was only the other moieties that had a negative influence.

In contrast to the teaching of D6, according to the invention it was found that a BPE content of not less than 0.4 wt% was advantageous in that it provided normal pressure dyeability without greatly reducing heat resistance or colour fastness.

Thus the teaching of D6 to reduce BPE content was contrary to the subject-matter claimed.

D7 related to the production of poly(trimethylene terephthalate), but did not contain any details of the Ti catalyst used. With regard to oligomers, D7 merely taught that these were formed and that the formation thereof was thermodynamically controlled. However D7 contained no concrete information regarding the impact of the presence of oligomers, for example in terms of adverse effects. Nor did D7 contain any teaching as to which problem would be addressed by controlling the content of cyclic dimer according to condition (3) of claim 1.

With regard to the condition (3) of the claim, there was no evidence to support the position of the opposition division that this was inherently disclosed by D6. Due to the lack of any detailed information in D7 with respect to cyclic dimer content the skilled person would have had no motivation to take this document into consideration for solving the problem set out in the patent in suit.

With regard to D34 to which reference was made in D6,

all that could be derived therefrom was that concentrations of BPE of below 0.1% were advantageous, and hence did not add anything going beyond the teaching of D6. At most D34 taught that BPE was responsible for discoloration resistance, stability to thermal decomposition, melting point and TG.

Contrary to the conclusion of the opposition division, there was no indication in the prior art that a certain minimum polyether content above zero resulted in advantageous effects on the polyester dyeability characteristics. This was demonstrated by experimental reports D29 and D30, both submitted during the opposition proceedings.

- XI. The respondent in its rejoinder did not address the findings of the decision under appeal or the submissions of the appellant, but restricted itself to refiling submissions from the opposition procedure as well as a copy of Decision T 1591/08 which was stated - with no supporting argumentation or reasoning - to show that the claims as submitted with the statement of grounds of appeal were not directed to inventive subject-matter.

- XII. The appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent in suit be maintained on the basis of the main request, set of claims 1-7 submitted with letter dated 23 July 2007.

- XIII. The respondent (opponent) requested that the appeal be dismissed.

Reasons for the Decision

1. Both parties have indicated that they will not attend, i.e. be absent from the oral proceedings. Pursuant to Article 15(3) RPBA this means that the parties are to be treated as relying on their respective written cases.

2. Status of the submissions of the respondent

In the rejoinder the respondent submitted that the claims did not relate to a patentable invention. However, contrary to the requirements of Article 12(2) RPBA no indication was provided as to which requirements of the EPC were considered not to be fulfilled. Nor was any discussion of the reasoning of the decision under appeal or the submissions made in the statement of ground of appeal advanced.

Instead the Board and the appellant were in effect invited to consult:

- a previously made written submission attached as copy which itself consists essentially of exhortations to refer to earlier submissions;
- a decision of another Board of Appeal and
- the remainder of the official file

in order to assemble the case on the respondent's behalf.

Thus the submissions of the respondent amount to nothing more than an unreasoned request to dismiss the appeal.

3. As follows from the summary of the decision of the opposition division given above, the sole question to be addressed in the appeal proceedings is that of inventive step.

The findings of the opposition division with respect to the other matters (clarity, sufficiency, novelty, added- subject-matter) were not challenged by either party.

3.1 The subject-matter of the patent in suit

The patent in suit is directed to the provision of a polyester resin for fibre production having high whiteness, good spinning stability and excellent melt stability, therein the polyester is predominantly made up of poly(trimethylene)terephthalate ("PTT") (claim 1, paragraph [0001]).

Compared to the production of poly(ethylene terephthalate) or poly(butylene terephthalate), production of poly(trimethylene terephthalate) is, according to paragraphs [0004]-[0007], beset by three essential technical difficulties:

- whiteness;
- spinning stability and
- melt stability.

None of the conventional methods known allow all three properties to be optimised or the associated problems to be overcome (paragraph [0008]).

The patent in suit sets out to solve the three problems as explained above and to provide a solution where all three factors are optimised (paragraph [0018]), whereby the problem of the content of impurities leading to the

noted adverse effects is addressed by addition of a phosphorus compound and optimising the polymerisation conditions.

3.2 Closest prior art

According to the decision, the closest prior art was represented by D6 which is directed to the synthesis and properties of fibre grade PTT (called "PTMT" in D6). The polymer produced has a high degree of whiteness (summary).

It is explained at the bottom of page 180 that when titanium compounds are used for the production of PET the polymer exhibits a strong yellow colour but that such discoloration only occurs to an insignificant amount in the polymerisation of PTT.

On page 182, 4th paragraph D6 cautions against the introduction of bis-3-hydroxypropyl ether groups as a side reaction, which, is known from PET technology to impair the polymer properties. Furthermore incorporation of diethylene glycol moieties is likewise undesirable since this leads to reduction of melting temperature and lower thermal and light stability.

3.3 Distinguishing features

According to the decision under appeal, two features of the claim were not explicitly disclosed in D6:

- (3) 3 wt% or less of cyclic dimer is contained;
- (4) from 0.4-2 wt% or less of bis(3-hydroxypropyl) ether is contained and copolymerized with poly(trimethylene terephthalate).

D6 describes on page 181 the synthesis of PTT by transesterification of dimethyl terephthalate with 1,3-

propanediol at a given temperature, molar ratio of reactants and under a nitrogen atmosphere as well as a defined amount of titanium tetrabutylate catalyst. The content of cyclic dimer - feature (3) - is not disclosed.

However the opposition division held, with reference to D7 which was considered to be a general technical teaching representative of knowledge in the field, that feature (3) was inherently disclosed.

The assessment of the status of D7 and what can be derived therefrom, in particular the general applicability of its disclosure in the decision under appeal is in the view of the Board incorrect.

Firstly, regarding the actual disclosure of D7 with respect to that of D6, it is not disputed that D7 relates to the production of PTT and discloses in the third column on the first page a wide range of generally defined reaction conditions regarding temperature, pressure and catalysts. In the tables at the top of the second page of the document, in particular Table 3, specific production conditions are disclosed.

However, it is apparent that the production conditions of D6 and D7 are not identical. Thus D6 at page 181 specifies a reaction temperature that is "slowly" increased over an undefined time from 140-220°C. Subsequently the temperature is further increased - over an undefined period - and polycondensation is carried out at 260-270°C. A molar ratio of diacid/diol of 1.4-2.2, at undefined pressure is employed.

In contrast D7 in Table 3 gives a temperature range of

260-275°C for the initial esterification for 100-140 minutes, a precondensation step at 255-270°C, for 30-45 minutes and a polycondensation temperature of 255-270°C for 160-210 minutes and a molar ratio of reactants 1.4 (whereby it is not explicitly stated which reactant is in excess) at atmospheric pressure.

Due to these differences in conditions, it is not possible on the basis of D7 to infer the outcome of the process reported in D6 and in particular the amount of cyclic dimers in the polyester produced therefrom.

Thus even if D7 does report on the second page in the third column that the polyesters obtained contain 2.5-3.0% of oligomers, mainly the cyclic dimer, for the foregoing reasons, this disclosure cannot provide any indication about the nature of the products of D6 since the polyesters of D6 and D7 were produced under different conditions. Nor has any evidence been advanced to prove an identity of properties.

Consequently the Board can concur with the position of the appellant that D6 does not provide a disclosure of feature (3) of the claim.

Accordingly the subject matter claimed is distinguished from the closest prior art by two features:

- the content of cyclic dimer being 3 wt% or less
- the content of bis(3-hydroxypropyl)ether of 0.4 to 2 wt% or less.

3.4 Technical effect

The position of the appellant, as set out in the final paragraph on page 7 of the statement of grounds of

appeal, is that it has been shown that maintaining a BPE content of not less than 0.4 wt% is advantageous in terms of providing normal-pressure dyeability without reducing heat resistance or colour fastness.

As observed in the preliminary communication of the Board, and not contradicted by the appellant, it appears, even if not explicitly stated, that the appellant in making this submission relies on the evidence of the reference example in paragraph [0067] of the patent comparing the dyeability of the polymers of comparative example 1 and example 2 of the patent (erroneously referred to as "reference example 5" in the communication).

According to this example two polyesters were compared.

That of comparative example 1 was prepared by esterification of dimethyl terephthalate with trimethylene glycol and a cobalt acetate/cobalt acetate tetrahydrate catalyst, the transesterification product being treated with trimethyl phosphate and titanium tetrabutoxide prior to polycondensation. The resulting polymer had a BPE content of 0.07 wt%.

In example 2 a polyester was prepared by reaction of terephthalic acid with trimethylene glycol under the action of cobalt carbonate. Prior to polycondensation the product was treated with tributyl phosphate and titanium tetrabutoxide. The final polymer had a content of BPE of 0.76 wt%.

The polymerisation conditions and the polyesters produced according to comparative example 1 and example 2 therefore differed in several fundamental respects, i.e. the amount of phosphorous and cobalt, X value

(molar number of phosphorus element of the phosphorus compound to the molar number of metal element used as the polycondensation catalyst (patent in suit, page 8 lines 52-55), intrinsic viscosity, content of cyclic dimer.

In dyeing tests it was shown that the fibre of comparative example 1 had dye exhaustion of 53% whilst that of example 2 was 84%, both having the same light fastness.

In view of this plurality of differences between the invoked examples with respect both to the manner of preparation of the polyester, i.e. in one case transesterification, in the other direct esterification, and the properties of the obtained polyesters, the data provided in reference example 1 of the patent resulting from the comparison of these two examples are not suitable to demonstrate whether the distinguishing feature i.e. of the content of BPE on its own gives rise to a technical effect.

Furthermore since both these examples have contents of cyclic dimer within the claimed range, they are, the above-noted non-comparability of the examples notwithstanding, in any case not suitable to provide evidence of a technical effect deriving from this feature.

Nor do the further examples of the patent present any suitable comparisons which would permit it to be assessed whether the distinguishing features - singly or in combination - give rise to any technical effect. and no arguments in this respect have been advanced by the appellant.

The appellant in its written submissions on the technical effect referred to experimental reports D29 and D30 (statement of grounds of appeal, section 2.2.3, third paragraph). However it was not explained how these documents related to the closest prior art D6 and how the data presented therein were suitable to show that the distinguishing feature(s) over D6 resulted in a technical effect. On the contrary, these reports refer to the document D2/D5 (EP-A-859 020 and the corresponding US publication US 5 798 433).

Hence these documents do not relate to the closest prior art D6 and hence it is obscure to the Board how the data reported therein can provide any relevant information.

3.5 The objective technical problem

In the light of the available evidence the technical problem objectively solved compared to the closest prior art D6 can only be formulated as the provision of further compositions based on those of D6, which problem was solved by defining the content of cyclic dimer and the content of BPE, i.e. features (3) and (4) of claim 1 respectively.

3.6 Obviousness

With respect to feature (3), as noted above with respect to D7, compositions intended for the same end uses are known that contain an amount of oligomers below 3 wt% (2.5-3 wt%, page 2 third column). Consequently the evidence is that this feature is known in the relevant prior art. In particular it is noted that D7 does not appear to ascribe any particular importance or significance to this feature and it

teaches that the amount of cyclic dimer in the polyester produced can be reduced by heating under nitrogen (page 2, first column). The preparation of polyester resins having less than 3 wt% of cyclic dimer is therefore obvious in view of D7.

Regarding feature (4) the appellant has invoked the teachings of D34 and the evidence of experimental reports D29 and D30.

D34 is reference 10 on page 181 of D6, invoked in respect of the procedure for preparing PTT. The appellant refers to D34, page 56, last sentence and page 55 second paragraph, which passages report that BPE is formed during preparation of PTT, and results in reduction of light-fastness and of oxidative stability. The same passage of page 56 of D34 also teaches that the BPE content of polymers formed according to the process of D34 was under 0.1%. While D34 indeed teaches that a low amount of BPE can be beneficial to the optical and rheological properties of the produced polyesters, that teaching is of a general character and is not made dependent on the value of 0.1 wt% disclosed on page 56; rather that specific value is in the nature of an estimation of the BPE content of the polyester according to D34

Also, as noted there is no evidence for any technical effect arising from a BPE content of from 0.4 to 2 wt%. D34 does indeed provide a reason to adopt a low level of BPE down to 0.1 wt%, but the step of adopting an embodiment (BPE content of 0.4 to 2 wt% according to claim 1) which is known to be less advantageous cannot, on its own, i.e. in the absence of evidence for an unexpected technical effect, provide the basis for recognising an inventive step. In this respect

reference may be made to the general discussion of the pertinent case law in the publication "Case Law of the Boards of Appeal of the European Patent Office", 8th Edition, 2016, Section I.D.9.18).

Furthermore, no evidence or arguments were provided to demonstrate the existence of a technical effect arising from the combination of the two distinguishing features. Thus each of these can be selected by the skilled person individually and in isolation of each other.

The conclusion is that the subject-matter of operative claim is the result of obvious, non-inventive modifications of the teaching of the closest prior art D6, in the light of D7 or D34 and hence does not meet the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



M. Cañueto Carbajo

D. Marquis

Decision electronically authenticated