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Datasheet for the decision of 10 December 2014

Case Number: T 1161/10 - 3.3.03

Application Number: 93304555.1

Publication Number: 0575111

IPC: H01B3/44

Language of the proceedings: EN

Title of invention:
Polymeric insulating material and formed article making use of the material

Patent Proprietor:
Prime Polymer Co., Ltd.

Opponents:
Borealis Technology OY
Treofan Germany GmbH & Co. KG

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - all requests (no)

Decisions cited:

Catchword:

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Case Number: T 1161/10 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 10 December 2014

Appellant: (Patent Proprietor)	Prime Polymer Co., Ltd. 5-2, Higashi-Shimbashi 1-chome Minato-ku Tokyo 105-7117 (JP)
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Appellant: (Opponent 1)	Borealis Technology OY P.O.Box 330 06101 Porvoo (FI)
Representative:	Pillep, Bernhard Kador & Partner Corneliusstrasse 15 80469 München (DE)
Party as of right: (Opponent 2)	Treofan Germany GmbH & Co. KG Bergstrasse 66539 Neunkirchen (DE)
Representative:	Besier, Thomas Mai, Dörr, Besier Patentanwälte Kreuzberger Ring 64 65205 Wiesbaden (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 23 March 2010 concerning maintenance of the European Patent No. 0575111 in amended form.**

Composition of the Board:

Chairman	B. ter Laan
Members:	O. Dury
	C. Brandt
	D. Marquis
	C. Vallet

Summary of Facts and Submissions

I. The appeals by opponent 01 and the patent proprietor lie against the decision of the opposition division posted on 23 March 2010, maintaining European Patent No. 0 575 111 (based on application No. 93 304 555.1) in amended form.

II. Two notices of opposition were filed, each requesting revocation of the patent in its entirety on the grounds of Art. 100(a) EPC (lack of novelty and lack of inventive step), Art. 100(b) EPC and Art. 100(c) EPC.

III. In the decision under appeal reference was made, *inter alia*, to the following documents:

E1: EP-A-0 340 688
E2: EP-A-0 449 302
E3: A.R. Blythe, Electrical Properties of Polymers, Cambridge Univ.Press 1979, pages 90, 91, 154, 155
E6: DE 28 48 884
E9: EP-A-0 330 019
E10: EP-A-0 362 563
E13: EP-A-0 227 300

IV. The contested decision was based on a main and two auxiliary requests. Claim 1 of auxiliary request 2 (6 claims) read as follows:

"1. An electrical insulating film having a thickness of 1 to 6 µm obtained by biaxially stretching a polymeric insulating material having a high dielectric breakdown voltage, comprising polypropylene which contains, by weight,
(i) not more than 40 ppm ash, when analyzed by completely burning the polypropylene in air, the ash

contains not more than 1 ppm Ti, based on the weight of the polypropylene,
(ii) not more than 2 ppm chlorine, and
(iii) 1-10 % boiling n-heptane soluble matter; and
which polypropylene is obtainable by polymerizing propylene in a yield of at least 300,000 g/g-Ti based on Ti in the catalyst, using a polymerization catalyst which comprises
a) a solid titanium catalyst component containing titanium, magnesium, a halogen and an electron—donating compound (an internal electron—donating compound),
b) an organometal compound containing a metal selected from Groups 1, 2 and 3 of the Periodic Table, and
c) another electron-donating compound (an external electron—donating compound)."

Claims 2-6 were directed to embodiments of the film according to claim 1.

According to the contested decision, the main request was anticipated by a public prior use, auxiliary request 1 was not admitted to the proceedings and auxiliary request 2 fulfilled the requirements of Art. 123 (2) EPC, Art. 83 EPC, Art. 54 EPC and Art. 56 EPC. Starting from the public prior use as closest prior art, the opposition division in particular considered that the cited prior art failed to provide an incentive to combine the specific features (purity requirements of the polymeric material plus thickness of the film) in order to provide films that were able to maintain their electrical characteristics better than conventional materials when formed into biaxially stretched films of a thickness in the claimed range. Consequently, an inventive step was acknowledged and the patent was maintained in amended form on the basis of auxiliary request 2.

V. On 19 May 2010, opponent 01 (appellant 01) lodged an appeal against the above decision. The prescribed fee was paid on the same day. In the statement of grounds of the appeal, filed on 15 July 2010, opponent 01 requested that the decision of the opposition division be set aside and the patent be revoked.

Further arguments were submitted with letter of 27 June 2011.

VI. On 2 June 2010, the patent proprietor (appellant 02) lodged an appeal against the above decision. The prescribed fee was paid on the same day. In the statement of grounds of the appeal, filed on 2 August 2010, the patent proprietor requested that the decision of the opposition division be set aside and the patent be maintained in amended form according to the main request, or alternatively to any of auxiliary requests 1-3, all requests filed therewith.

Each of claim 8 of the main request, claim 6 of auxiliary request 1, claim 5 of auxiliary request 2 and claim 1 of auxiliary request 3 was identical to claim 1 of auxiliary request 2 on which the contested decision was based.

VII. With letter of 8 July 2014 opponent 02 (respondent) requested a decision according to the state of the file and announced that, should they be arranged, they would not attend oral proceedings.

VIII. In a communication issued on 11 September 2014 accompanying the summons to oral proceedings to be held on 10 December 2014, the Board set out its preliminary view of the case and indicated that further submissions should be filed before 10 November 2014. For each of

the operative requests, the attention of the parties was in particular drawn to issues related to Rule 80 EPC as well as Art. 54, 56, 83, 84 and 123(2) EPC. In respect of inventive step, it was in particular indicated that E1 appeared to represent the closest prior art document and that during the oral proceedings it would have to be discussed if E2 or the public prior use was more relevant. Further issues were also identified that could have to be discussed in order to assess the presence of an inventive step starting from E1 (sections 9.3 to 9.6 of the communication).

IX. With letter of 30 October 2014, opponent 01 withdrew its request for oral proceedings.

X. By fax received on 9 December 2014, the patent proprietor withdrew its request for oral proceedings. The pending requests were maintained.

XI. Oral proceedings were held on 10 December 2104 in the absence of all parties.

XII. The patent proprietor's arguments as relevant for the present decision may be summarised as follows:

Inventive step

a) The subject-matter according to the present requests was based on an unexpected technical effect and therefore was inventive. The claims directed to the electrical insulating films having a thickness of 1-6 µm had already been acknowledged by the opposition division to involve an inventive step.

b) Opponent 01's reasoning starting from either E2 or the public prior use failed to consider the improvement shown in the patent in suit in terms of dielectric breakdown voltage for thin films of 4 µm. Said improvement was, however, not obvious in the light of the cited documents.

XIII. Opponent 01's arguments as relevant for the present decision may be summarised as follows:

Inventive step

a) The claims were drafted as product-by-process claims. However, the features regarding the production of the polypropylene resin had to be disregarded when comparing the claimed subject-matter with the prior art.

b) Either the public prior use, E1 or E2 was a suitable starting point. Each of E1 and E2 in particular disclosed capacitor grade polypropylenes very similar to those defined in the patent in suit as regards their properties as well as their production method with a high yield catalyst.

It was known in the art, e.g. E3, that capacitor grade polypropylene should be of very high quality i.e. free of voids and impurities. Further it was common general knowledge (see E2, E10, E13) that the thickness of electric insulating materials having a high dielectric breakdown should be reduced. Therefore, the skilled person would arrive at the claimed subject-matter by merely following what was known in the art and without having to apply any inventive activity.

XIV. Appellant 01 (opponent 01) requested that the decision under appeal be set aside and the patent be revoked.

Appellant 02 (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained in amended form according to the main request or alternatively to any of auxiliary requests 1 to 3, all requests filed with the statement setting out the grounds of the appeal dated 2 August 2010.

The respondent (opponent 02) did not submit any substantive requests.

XV. The Board announced its decision at the end of the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. The appellants and the respondent were duly summoned to oral proceedings but did not attend, and the oral proceedings were continued in their absence in accordance with Rule 115(2) EPC, the parties being treated as relying only on their written case (Art. 15(3) RPBA).

Main request

3. The present decision focuses on claim 8 of the main request, which is identical to claim 1 of auxiliary request 2 on which the contested decision is based, and

which is directed to a specific electrical insulating film having a thickness of 1 to 6 µm.

4. Inventive step

4.1 Closest prior art

4.1.1 The patent in suit concerns polymeric insulating material and formed article making use of the material. According to paragraphs [0001], [0006] to [0008] and [0020] the problem to be solved is to provide thin films (6 µm or less, in particular 1 to 6 µm) having improved breakdown resistance as measured in terms of dielectric breakdown voltage.

4.1.2 E1 discloses a process for the preparation of high-purity polyolefins (claims 1 and 12; page 2, lines 3-4, 9-11), in particular polypropylene (claim 7), for making capacitors (page 2, lines 19-32). In example 2 of E1 propylene is polymerised using a catalyst system that comprises a solid catalyst prepared according to example 1, triethylaluminium, as well as diphenyldimethoxysilane (E1: page 5, lines 40-45). Triethylaluminium falls under the definition of feature b) of claim 8 of the present main request (aluminium is a metal of Group 3A of the Periodic Table) and diphenyldimethoxysilane under feature c). A further piece of evidence in that respect is that both compounds are specifically indicated in paragraphs [0045] and [0044], respectively, of the patent specification. The solid catalyst of example 1 contains titanium, magnesium, chloride and diisobutyl phthalate (E1: page 5, lines 15-17) - the latter being an electron-donating compound in the sense of the patent in suit (see paragraph [0040]) - and is therefore a catalyst according to feature a) of operative claim 8.

Therefore, the catalyst prepared in example 2 of E1 comprises components a), b) and c) according to operative claim 8. The polypropylene prepared in example 2 of E1 exhibits a titanium residue of 0.37 ppmw, a chloride residue of 9.2 ppmw and a total ash residue of 30 to 40 ppmw (Table I of E1) and therefore fulfils the requirements of feature (i) of operative claim 8. The chlorine content of said polypropylene is however higher than that specified in operative claim 8. In that respect, although E1 discloses that the polypropylenes prepared have a chlorine content "lower than 10 ppmw" (claim 12; page 2, lines 24-25), all the polypropylenes actually prepared in the examples exhibit a chlorine content of at least 5 ppm (E1: Table I-II), which is outside the range specified in operative claim 8. Furthermore, although E1 discloses an isotactic index of at least 96 % by reference to prior art (E1: page 2, lines 10-11), which parameter was held by opponent 01 to be related to the boiling n-heptane soluble matter according to feature (iii) of operative claim 8, there is no specific disclosure of that parameter regarding the polypropylenes actually prepared in E1.

Therefore, although not all parameters of operative claim 8 are disclosed, the polypropylenes prepared in E1 are considered to be high-yield and pure polymers suitable for making electrical insulating films usable for capacitors, so that E1 represents a suitable starting point for the assessment of inventive step.

4.1.3 E2 also discloses a process for the preparation of high-purity polypropylene for making capacitors, whereby the polypropylene exhibits an ash content of less than 15 ppm (claim 1; page 2, lines 1-5). The polypropylene further preferably has an isotactic index

higher than 90, which is, according to appellant 01, equivalent to having a boiling n-heptane soluble matter of less than 10 %. That argument was not contradicted by appellant 02. According to page 2, lines 32-36 of E2, the polypropylene has a chlorine content of less than 5 ppm, which is more than specified in claim 8 of the main request, and a Ti content of less than 1 ppm. In examples 1 and 2 of E2, a polypropylene is prepared using a catalyst that appears to comprise components a) and b) but no external electron-donating compound c) according to claim 8 of the main request. Therefore, the examples illustrative of the subject-matter of E2 do not appear to have been carried out using a catalyst as defined in operative claim 8.

4.1.4 The public prior use concerns the sale of a polypropylene film. It does not appear to be possible to determine how the polypropylene contained in the film of the public prior use was prepared (nature of catalyst; polymerisation yield).

4.1.5 Operative claim 8 is drafted as a product-by-process claim, specifying that the polypropylene is "obtainable by" a process characterised by a specific yield and using a specific catalyst. Considering that the catalyst does not only influence the properties of the polymer, but its residues will also be present in the polypropylene prepared, it characterises the product in terms of its constituents (chemical components according to features a)-c)). Besides, according to paragraphs [0024]-[0026] of the patent in suit the yield and the catalyst defined in operative claim 8 in particular lead to an improved dispersion of titanium without agglomeration in the polypropylene. Therefore, contrary to opponent 01's opinion, the features regarding the production of the polypropylene resin are

seen as characterising the obtained product *per se* and can, in the present circumstances of the case, not be disregarded when comparing the claimed subject-matter with the prior art.

4.1.6 For the above reasons, as proposed in its communication, the Board considers E1 to be the most appropriate starting point for the inventive step assessment.

4.2 Problem solved in view of the closest prior art

4.2.1 According to paragraphs [0001] and [0006] to [0008] of the patent in suit, the problem to be solved is to provide thin films having improved breakdown resistance (as measured in term of dielectric breakdown voltage).

4.2.2 In the contested decision the opposition division considered that the examples of the patent in suit showed that the claimed films were able to maintain their electrical characteristics better than conventional materials when formed into biaxially stretched films of a thickness in the claimed range (contested decision: page 9, last paragraph). That conclusion may be followed for films according to those examples, which were all made from a material consisting of a polypropylene as defined in claim 8.

4.2.3 However, claim 8 is directed to a film obtained by biaxially stretching a polymeric material *comprising* the high-purity polypropylene (emphasis added by the Board).

It has not been shown, nor is it credible, that the problem relied upon by the opposition division is also

solved for materials comprising the polypropylene in a small amount, which is within the ambit of operative claim 8. In that respect, it is indicated in paragraph [0036] of the patent in suit that the polymeric insulating material specified in operative claim 8 encompasses polyblends i.e. blends of polypropylene as defined therein with other polymers. Although it is indicated that it is preferred to limit the proportion of polymer(s) other than polypropylene to a level not greater than 30 wt.%, such a limitation is not reflected in operative claim 8. Since the problem formulated by the opposition division has therefore not been shown to be solved over the whole scope of operative claim 8, it cannot be followed.

4.2.4 In view of the above, the technical problem to be solved is seen as to provide thin films for making capacitors.

4.2.5 In the absence of any evidence to the contrary, it is credible that the technical problem defined above is effectively solved.

4.3 Solution

The subject-matter of claim 8 differs from the examples of E1 in that it is directed to biaxially stretched films characterised in that the polypropylene exhibits:

- a chlorine content of not more than 2 ppm (feature ii));
- a specific amount of boiling n-heptane soluble matter (feature iii)).

4.4 Obviousness

4.4.1 The question has to be answered if the skilled person desiring to solve the above identified problem would, in view of the prior art, have modified the disclosure of the closest prior art E1 in such a way as to arrive at the claimed subject matter.

4.4.2 E1 discloses that the polypropylenes prepared therein are capacitor grade polymers (E1: page 2, lines 30-31). Although electrical insulating films having a thickness of 1 to 6 µm are not disclosed in E1, such films, including those made of polypropylene, are known in the art, see E9: claim 8 (polypropylene films as thin as 3 µm), E10: claim 9 (polypropylene films as thin as 3 µm).

4.4.3 It is also known in the art that capacitor grade polymers, in particular polypropylene, should be particularly pure (E1: page 2, lines 19-32; E2: page 2, lines 3-5 and 32-39; E3: page 90, last paragraph; E9: col. 1, lines 10-36 and col. 2, lines 43-49; E10: page 2, lines 4-12 and 44-45; E13: page 4 and claims 5, 7). Those documents refer in particular to the properties specified in operative claim 8 i.e. ash content (E1, E2, E9, E10, E13), chlorine content (E1, E2, E9, E10) and boiling n-heptane soluble matter (E2, E13). In that respect, the argument of opponent 01 that an isotactic index higher than 90 disclosed in E2 was equivalent to a boiling n-heptane soluble matter of less than 10 % had not been contradicted by the patent proprietor. E9, E10 and E13 further specifically deal with improving the dielectric breakdown strength of polypropylene films for capacitors.

The results shown in Table II of E1 in respect of

examples 4-8 further show that there is a correlation between ash content and chlorine content, so that features i) and ii) specified in operative claim 8 are considered to be interrelated. Furthermore, not only do the cited documents show that properties i) to iii) specified in operative claim 8 may not be considered as antagonists with respect to each other, but documents E2 and E13 (see passages cited in the preceding paragraph) indicate that the skilled person had good reasons to study those properties simultaneously.

Concerning feature ii), although none of the cited documents explicitly discloses chlorine contents as low as 2 ppm, each of E1, E2, E3 E9, E10 indicates that the skilled person would have had good reasons for minimising the chlorine content as discussed above. That conclusion is further confirmed by paragraph [0031] of the patent in suit, where it is stated that it is well known that ionic impurities, in particular chlorine, give deleterious effects to electrical characteristics. E6 further shows that techniques to reduce the chlorine content after polymerization were known in the art.

4.4.4 Regarding the n-heptane soluble matter (feature iii)), the patent proprietor has neither argued nor shown that the range specified in operative claim 8 was related to any technical effect. E2 and E13 further show that said range is usual in the art. There is also no evidence on file whether said feature is not implicitly satisfied e.g. by the polypropylene prepared in the example of E1; considering that the catalyst used in example 2 of E1 satisfies the requirements a) to c) specified in operative claim 8, the presence of n-heptane soluble matter as claimed is plausible. Therefore, that feature cannot contribute to the inventive step.

4.4.5 Finally, it was neither argued nor shown that it would not be possible to prepare polypropylene satisfying requirements i) to iii) according to operative claim 8, by following the teaching of E1.

4.4.6 Under these circumstances, in particular because of the absence of any technical effect shown over the whole scope of the claim, it is obvious to solve the above identified problem by using any polypropylene prepared according to E1, including those satisfying features i)-iii) according to operative claim 8.

4.4.7 The subject-matter of operative claim 8 is therefore not inventive.

4.5 As a consequence, the main request as a whole does not satisfy the requirements of Art. 56 EPC and is not allowable.

Auxiliary requests 1-3

5. Claim 8 of the main request is identical to each of claim 6 of auxiliary request 1, claim 5 of auxiliary request 2 and claim 1 of auxiliary request 3. Consequently, for the same reasons as indicated for the main request, none of auxiliary requests 1-3 satisfies the requirements of Art. 56 EPC.

6. Under these circumstances, it is not needed to deal with the other objections raised by opponent 01 or identified in the communication of the Board (Art. 54, 83, 123(2) and 123(3) EPC).

7. As none of appellant 02 (patent proprietor)'s requests is allowable, the patent has to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The European patent No. 0 575 111 is revoked.

The Registrar: The Chairman:

B. ter Heijden B. ter Laan

Decision electronically authenticated