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**Datasheet for the decision
of 29 November 2007**

Case Number: T 0931/05 - 3.3.09

Application Number: 96113333.7

Publication Number: 0776926

IPC: C08J 5/18

Language of the proceedings: EN

Title of invention:

A biaxially oriented polypropylene film and a capacitor made thereof

Patentee:

TORAY INDUSTRIES, INC.

Opponent:

Treofan Germany GmbH & Co.KG

Headword:

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Relevant legal provisions:

-

Relevant legal provisions (EPC 1973):

EPC Art. 83

Keyword:

"Insufficiency of disclosure (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0931/05 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 29 November 2007

Appellant:
(Opponent)

Treofan Germany GmbH & Co.KG
Am Prime Parc 17
D-65479 Raunheim (DE)

Representative:

-

Respondent:
(Patent Proprietor)

TORAY INDUSTRIES, INC.
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Representative:

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 10 May 2005
rejecting the opposition filed against European
patent No. 0776926 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: P. Kitzmantel
Members: W. Ehrenreich
W. Sekretaruk

Summary of Facts and Submissions

- I. Mention of the grant of European patent No. 0 776 926 in respect of European patent application No. 96 113 333.7, filed on 20 August 1996 in the name of *Toray Industries, Inc.*, was announced on 9 April 2003 (Bulletin 2003/15).

The patent, entitled: "*A biaxially oriented polypropylene film and a capacitor made thereof*" was granted with ten claims, Claims 1, 4, 5 and 6 reading as follows:

"1. A biaxially oriented polypropylene film that is 98-99.5% in isotacticity, above 99% in isotactic pentad fraction, less than 30 ppm in ash content, less than or equal to 10 ppm-% in the product of the film's ash content and internal haze (%), 72-78% in the film's crystallinity, and 1-4% in the sum of the machine- and transverse-direction heat shrinkage at 120°C."

"4. A biaxially oriented polypropylene film as described in any of claims 1-3 that is 0.5-40 μm in film thickness, d , and larger than $580-(200/d^{0.5})$ (V/ μm) in DC dielectric strength per unit thickness at 105°C."

"5. A biaxially oriented polypropylene film as described in any of claims 1-4 that contains at least one phenolic antioxidant having a molecular weight of 500 or more, with the antioxidant content being 0.03-1 wt.%."

"6. A capacitor wherein a biaxially oriented polypropylene film as described in any of claims 1-5 is used as dielectric."

Claims 2 and 3 were dependent on Claim 1 and Claims 7 to 10 were dependent on Claim 6.

II. Notice of opposition was filed by

Trespaphan GmbH & Co. KG, now Treofan Germany GmbH & Co. KG

on 9 January 2004.

The Opponent based its opposition on the grounds according to Articles 100(a) and 100(b) EPC and requested revocation of the patent in its entirety because the invention was insufficiently disclosed and lacked an inventive step, contrary to the provisions of Articles 83 and 56 EPC.

In support of its objections, the Opponent cited, *inter alia*, the following documents:

D1 Paper entitled "*From Highly Isotactic PP To Random Co- And Terpolymers*" distributed at the Polypropylene World Congress in October 1992 in Zürich

D2 US-A 4 283 463.

III. With its decision, issued in writing on 10 May 2005 the Opposition Division rejected the opposition.

Concerning the opposition ground according to Article 100(b) EPC the Opposition Division held that sufficient information was given in the patent specification as to how a polypropylene raw material with an isotactic pentad fraction above 99% could be prepared by using a high purity polymerization catalyst.

As to the issue of inventive step the Opposition Division defined the problem to be solved by the invention as the provision of a capacitor with good long-term dielectric properties at high temperatures of 105°C. In its view, the examples in the patent specification showed that the problem was solved by the features (i) to (vi) specified in Claim 1.

Document D2, which represented the closest prior art disclosed biaxially oriented polypropylene films for capacitors having a high isotactic index (i) and a high isotactic pentad fraction (ii) but did not mention the remaining features concerning (iii) the ash content, (iv) ash content times internal haze, (v) crystallinity and (vi) heat shrinkage.

In the Opposition Division's view it was not rendered obvious by D2 in combination with any of the further cited documents, for instance D1, that all six parameters claimed were indispensable for solving the problem posed.

- IV. On 18 July 2005 the Opponent - hereinafter: the Appellant - lodged an appeal against the decision of the Opposition Division. The Statement of the Grounds of Appeal, wherein the Appellant maintained its objections as to insufficiency of disclosure and lack of inventive step, was submitted on 20 September 2005.

V. With the letter of response dated 20 February 2006 the Patent Proprietor - hereinafter: the Respondent - defended, as a main request, the maintenance of the patent as granted and filed two sets of claims as bases for auxiliary requests 1 and 2.

The claims according to auxiliary requests 1 and 2 differ from the granted claims in that

- Claim 1 according to auxiliary request 1 now contains the feature of granted Claim 4 "*and larger than $580 - (200/d^{0.5})V/\mu\text{m}$ in DC dielectric strength per unit thickness at 105°C*" after "heat shrinkage at 120°C" with the consequential omission of the corresponding feature in Claim 4;
- Claim 1 according to auxiliary request 2 is a combination of granted Claims 1 and 5 with the consequential renumbering of granted Claims 6 to 10 which now bear the number "5 to 9".

During the oral proceedings before the Board, which were held on 29 November 2007, the Respondent submitted, in reaction to a comprehensive discussion of sufficiency of disclosure under the provisions of Article 83, a new set of claims as the basis for auxiliary request 3.

VI. The arguments of the Appellant concerning sufficiency of disclosure, provided mainly in written form, are summarized as follows:

The claimed invention could not be carried out by a skilled person because:

- (a) the description of the patent specification did not indicate whether the polypropylene raw material with the high isotacticity as required in Claim 1 was commercially available or how it could be manufactured and
- (b) no specific film manufacturing conditions other than those which were common in the prior art were described in the patent.

Concerning point (a) it should be noted that the commercial availability of a polypropylene raw material with the claimed high isotacticity values was doubtful, in particular because the patent specification did not indicate any sources of supply. As regards the reworking of such a material the skilled person was therefore dependent on the disclosure in the patent specification, which, however, merely stated in paragraph [0017] that the manufacture of such a raw material required a catalyst of high purity. It was, however, not credible that this indication was sufficient for its manufacture, in particular because the patent specification lacked any information about the nature of such a catalyst.

Concerning point (b), it was not disclosed which specific process conditions, within common processing ranges for film manufacture, such as stretching ratios and temperatures or the temperature of the casting drum during cooling of the film, had to be applied in order to provide the film with properties which made it suitable for capacitor applications.

This lack of disclosure of specific process conditions therefore meant that the skilled person would not be

able to manufacture capacitors with the desired dielectric strength and operational life.

VII. As regards Article 83 EPC the Board made the point in the oral proceedings, with reference to its opinion expressed in the communication dated 5 November 2005, that the issue of sufficiency of disclosure went beyond the question whether a polypropylene raw material was or was not available at the effective filing date. This issue had in particular to be considered together with granted Claim 6 claiming a capacitor using the film according to Claim 1 as dielectric, for which specific requirements as to dielectric strength and operational life had to be fulfilled.

Although it could be accepted that isotacticity and pentad fraction of the film corresponded to the properties of the starting raw polymer, the other claimed film parameters, ie haze, crystallinity and shrink, were dependent on the temperature of the casting drum, the stretching conditions and the temperature of the heat treatment thereafter and influenced the dielectric strength as well as the desired operational life of the claimed capacitor.

As regards the Respondent's position (presented in the written proceedings) that all film manufacturing conditions employed were within conventional ranges, the Board pointed out with respect to paragraph [0018] of the patent specification that the selection of special manufacturing conditions, going beyond conventional techniques, was apparently necessary in order to achieve films providing the capacitor claimed in Claim 6 with the desired properties.

In the light of these observations the Board posed the question to the Respondent whether the patent specification contained sufficient guidance for a skilled person seeking to attain the claimed film and capacitor properties without an inventive effort.

VIII. In response to the above question the Respondent argued as follows:

The selection of processing conditions, such as stretching ratios and temperatures, casting drum temperatures or adjustment of the film thickness, with the aim of influencing the heat shrinkage and the crystallinity of the claimed film were common measures which could be performed by a skilled person by way of routine experiments. The skilled person also knew that the product of the ash content and the internal haze was adjustable via the purity of the polymerization catalyst. As it happened, preferred processing conditions were described in paragraphs [0017] and [0020] (high purity of the catalyst), [0018] (casting drum temperature and shrink conditions) and [0023] (film thickness).

Furthermore, it should be noted that the crystallinity of 72-78% for the claimed film could not be achieved with a high isotactic polypropylene homopolymer (emphasis by the Board). This was known to a skilled person from the patent specification itself in which the word "homopolymer" was nowhere used and which indicated in paragraph [0015] that the copolymerization rate of the raw material should be less than 1%.

The unsuitability of high isotactic polypropylene homopolymer for the preparation of capacitor films having a crystallinity within the claimed range also followed from the disclosure in D1, which dealt *inter alia* with the relationship between the molecular structure of different polypropylene families and their crystallinity.

It could be derived from the information given on page IV-1.5 together with Table 2 of this document that the crystallinity index of a high isotactic polypropylene homopolymer (HIPP) with an isotactic index above 0.96 was 94% and consequently considerably higher than the claimed crystallinity range of from 72-78%. In contrast thereto, copolymers or terpolymers showed a lower crystallinity index, which was slightly above or within the claimed range.

In view of the above, a skilled person was aware that a polypropylene copolymer had to be used in order to prepare the claimed films with crystallinity values of 72-78% according to Claim 1.

IX. The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 776 926 be revoked.

The Appellant further requested that auxiliary request 3 be not admitted into the proceedings.

X. The Respondent requested that the appeal be dismissed or alternatively that the patent be maintained on the basis of one of the auxiliary requests 1 and 2 submitted with the letter dated 20 February 2006 or on the basis of auxiliary request 3 dated 29 November 2007.

Reasons for the Decision

1. The appeal is admissible.
2. Admission of auxiliary request 3 into the proceedings

The claims according to auxiliary request 3 were drafted by the Respondent during the oral proceedings in order to overcome the objection under Article 83 EPC that the patent specification lacked the disclosure of specific film processing conditions which would enable the skilled person to prepare films which were suitable for capacitor applications (point VI (b)).

The request, however, did not take the Respondent's previous statement into consideration that high isotactic polypropylene homopolymers are unsuitable for the performance of the invention (point (VIII)). Because, as will be shown below, this unsuitability of polypropylene homopolymers leads to the revocation of the patent because of insufficiency of disclosure, the amendments to the claims of auxiliary request 3 would not have any influence on the outcome of the appeal proceedings. The Board, therefore exercises its discretion in accordance with Article 10b(3) of the Rules of Procedure of the Boards of Appeal not to admit the request into the proceedings.

Main request, Auxiliary Requests 1 and 2

3. Sufficiency of disclosure - Article 83 EPC

Irrespective of the question whether or not the skilled person was in principle able, based on the film

preparation conditions given in the patent, to manufacture polypropylene films with the desired properties as capacitor dielectric, the Respondent's unambiguous statement in the oral proceedings that the use of a high isotactic polypropylene homopolymer was not comprised by the claimed invention - because of its causing too high crystallinity - is of crucial importance for the assessment of sufficiency of disclosure.

In the absence of objective evidence contradicting this statement of the Patent Proprietor, it is considered by the Board to reflect reality.

Since Claim 1 of the opposed patent and also Claim 6, relating to the use of the films of Claim 1 as capacitor dielectric, encompass the use of high isotactic polypropylene homopolymer, it follows that the claimed subject-matter does not fulfil the requirement of Article 83 EPC, namely that the skilled person must be able, on the basis of the information in the patent specification, to carry out the invention within the entire claimed scope.

Comparative example 3 confirms that films outside the claimed crystallinity range of from 72 to 78% (here 79%) are high in haze, high in the product (haze x ash content), have insufficient dielectric strength and provide inadequate operating life of a capacitor made therewith and are thus not in conformity with the claimed invention.

The same conclusion applies to the subject-matter of auxiliary requests 1 and 2 which are similarly

unrestricted with regard to the use of polypropylene homopolymer.

That Claim 1 indeed encompasses the use of high isotactic polypropylene homopolymer must be concluded on the basis of its wording "*A biaxially oriented polypropylene film that is 98-99.5% in isotacticity, above 99% in isotactic pentad fraction ...*" when read in the context of the description, especially paragraph [0015], which indicates that the film consists "*mainly of polypropylene, but may contain copolymerized elements consisting of other unsaturated carbon hydrides as long as they do not hinder the fulfillment of the invention*", and further on in the same paragraph: "*The copolymerization rate should be less than 1% considering the dielectric properties and heat resistance*", which statements make it quite clear that the presence of comonomers in the polypropylene molecules is optional, ie that the term polypropylene as used in Claim 1 encompasses polypropylene homopolymer. The above-quoted statements even suggest that the use of polypropylene homopolymer is the prior-ranking embodiment.

The lack of suitability of polypropylene homopolymers for capacitor applications is also not derivable from the available prior art. On the contrary, a skilled person being aware of D2, which is concerned with high isotactic polypropylene films having excellent dielectric properties and heat resistance and being therefore *inter alia* suitable for electrical applications like capacitor dielectrics (Claim 1; column 1, lines 5 to 11 and 40 to 44; column 7, lines 12 to 52), would learn from the passage (B)

"Polymerization of Propylene" in column 9 that the polypropylene of choice is a homopolymer.

The Respondent furthermore argued (see point VIII) that unsuitability of high isotactic polypropylene homopolymer films for the purposes of the invention was derivable from D1 because of the too high crystallinity of high isotactic polypropylene (HIPP). However, firstly, D1 is not concerned with polypropylene films and, secondly, D1 does not address the feasibility of the polymers concerned for the purpose of manufacturing films useful as capacitor dielectric. No conclusion can therefore be drawn from D1 as to this specific use.

The Respondent's argument that a skilled person, on the basis of the information in the prior art together with his common general knowledge, would not contemplate using a polypropylene homopolymer for capacitor dielectric applications is therefore not convincing.

4. From the above it follows that the invention claimed according to the main request and auxiliary requests 1 and 2 does not meet the requirements of Article 83 EPC.

The requests are therefore not allowable.

Order

For these reasons it is decided that:

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

The Registrar

The Chairman

G. Röhn

P. Kitzmantel