BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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

Datasheet for the decision of 16 December 2008

Case Number: T 1366/07 - 3.2.05

Application Number: 00953328.2

Publication Number: 1204523

IPC: B29C 49/00

Language of the proceedings: EN

Title of invention:
Container and its production process

Patentee:
Borealis Technology Oy

Opponents:
INEOS Manufacturing Belgium NV
THE DOW CHEMICAL COMPANY
Basell Polyolefine GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 83, 114(1), 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Late filed requests (admissible)"
"Amendments (allowable)"
"Sufficiency of disclosure (yes)"

Decisions cited:
-

Catchword:

-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1366/07 - 3.2.05

D E C I S I O N
of the Technical Board of Appeal 3.2.05
of 16 December 2008

Appellant: (Patent Proprietor)
Borealis Technology Oy
P.O. Box 330
FI-06101 Porvoo (FI)

Representative:
Pillep, Bernhard
Kador & Partner
Corneliusstrasse 15
D-80469 München (DE)

Respondent I: (Opponent 01)
INEOS Manufacturing Belgium NV
Scheldelaan 482
B-2040 Antwerpen (BE)

Representative:
Smith, Julian Philip Howard
Compass Patents LLP
120 Bridge Road
Chertsey
Surrey KT16 8LA (GB)

Respondent II: (Opponent 02)
THE DOW CHEMICAL COMPANY
2030 Dow Center
Midland
Michigan 48674 (US)

Representative:
Marsman, Hermanus Antonius M.
Vereenigde
Postbus 87930
NL-2508 DH Den Haag (NL)

Respondent III: (Opponent 03)
Basell Polyolefine GmbH
Brühler Strasse 60
D-50389 Wesseling (DE)

Representative:
Reverzani, Christina
HASELTINE LAKE
Theatinerstrasse 3
D-80333 Munich (DE)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 1 June 2007 revoking European patent No. 1204523 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: W. Zellhuber
Members: P. Michel
M. J. Vogel

Summary of Facts and Submissions

I. The appellant (patentee) lodged an appeal against the decision of the Opposition Division revoking European Patent No. 1 204 523.

II. The patent in suit was revoked by the Opposition Division on the ground of a lack of sufficiency of disclosure.

III. Oral proceedings were held before the Board of Appeal on 16 December 2008.

The appellant requested that the decision under appeal be set aside and that the patent in suit be maintained on the basis of the set of claims filed on 17 November 2008 as main request or, as an auxiliary measure, on the basis of one of the sets of claims submitted on the same day as the first to sixth auxiliary requests.

Respondents I, II and III (opponents 01, 02 and 03) requested that the appeal be dismissed.

The appellant and respondent II requested that the case be remitted to the first instance in the event that any of the claims be held to meet the requirements of Articles 83 and 123 EPC.

IV. The following documents are referred to in the present decision:

D12: EP-A-0 778 289
D22: EN ISO 527-2, Plastics - Determination of tensile properties

D23: ASTM D 1693-00, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
D24: the Pleasures and Problems of High Temperature GPC of Polyolefins, Lehtinen et al, International GPC Symposium, October 1-4, 1989
D25: Affidavit of Dr. Arja Lehtinen
D29: Experimental Report of Dr. Kapur
D34: Declaration by Dr. Iakovos Vittorias
D38: Römpp Chemie Lexikon, Falbe et al, 9th edition, pages 3530 and 3531
D39: Handbook of Polyethylene, Peacock, pages 10 and 11

V. Claims 1, 2 and 4 of the main request of the appellant read as follows:

"1. A process for the preparation of an at least 2L volume polyethylene container which process comprises blow moulding a bimodal HDPE, wherein said bimodal HDPE contains an ethylene homopolymer and an ethylene copolymer, and wherein the bimodal HDPE has the following characteristics:
- a density of 940 to 970 kg/m^3
- a weight average molecular weight of 200000 to 450000 D;
- a number average molecular weight of 6000 to 20000 D;
- a molecular weight distribution of 15 to 55;
- MFR_{21} of 2 to 12 g/10 min;
- tensile modulus at least 900 mPa; and
- a comonomer content of 0.5 to 10 wt%."

"2. A process according to claim 1, wherein the bimodal HDPE has the following characteristics:
- a density of 945 to 960 kg/m^3

- a weight average molecular weight of 250000 to 350000 D;
- a number average molecular weight of 7000 to 18000 D,
- a molecular weight distribution of 18-50;
- an MFR_{21} of 3 to 8 g/10 min; and
- a comonomer content of 1 to 2 wt%."

"4. A blow-moulded bimodal HDPE container having a volume of at least 2L, and an ESCR F_{50} of at least 500 hours, characterized in that said HDPE contains an ethylene homopolymer and an ethylene copolymer."

VI. The appellant argued substantially as follows in the written and oral procedure:

The requests on file were filed within the period specified in the invitation to oral proceedings and represent a serious attempt to overcome the objections set out in the invitation. The amended claims merely represent a new combination of features previously discussed. The requests should accordingly be admitted.

As regards the documents filed on 14 November and 10 December 2008, documents D38 and D39 merely represent the common knowledge of the skilled person. The features of the independent claims of the main request are disclosed in the application as filed in combination.

The disclosure of the patent in suit is sufficient to enable the person skilled in the art to prepare a bimodal HDPE having the molecular weight characteristics specified in claim 1.

In particular, the Examples can be reworked, resulting in polymers having values of molecular weight and density across the ranges claimed in claims 1 and 2. Whilst there is no disclosure of the reaction temperature in the gas phase reactor, the person skilled in the art would use a temperature which was sufficient to achieve the specified reaction rates as well as the specified melt flow resistance and density of the product. The pressure has no effect on molecular weight.

The figure of 69 kg PE/hour given in Example 2 of the patent in suit is the total amount of product. The low MW fraction given in the example is thus correct.

In addition, the molecular weight characteristics specified in claim 1 are quite usual in the art, as exemplified by documents D38 and D39. There is thus no need to proceed by trial and error in order to produce resins having the claimed molecular weight characteristics.

As stated in paragraph [0036] of the patent in suit, tensile modulus is measured according to the procedure specified in ISO 527-2 (document D22).

As disclosed in paragraphs [0019] and [0035] of the patent in suit and confirmed by the declaration of document D28, ESCR is measured according to the procedure specified in ASTM D1693 (document D23), condition B, 10% Igepal.

It is further noted that the respondents have been able to produce containers having an ESCR greater than 500 hours as specified in claim 4.

VII. The respondents argued substantially as follows in the written and oral procedure:

The large number of requests filed by the appellant constitutes an abuse of the procedure. The requests filed on 17 November 2008 were not filed within the period specified in the invitation to oral proceedings. In addition, no new issues were mentioned in the invitation. The requests should thus not be admitted into the proceedings. In addition, the late filed documents filed by the appellant with submissions dated 14 November and 10 December 2008 should not be admitted into the proceedings.

The application as filed does not disclose a bimodal HDPE containing an ethylene homopolymer and an ethylene copolymer. The bimodal HDPE referred to at page 6 of the published version of the application is not that mentioned on page 2. The requirements of Article 123(2) EPC are thus not satisfied.

It is not possible to rework the Examples of the patent in suit, at least without undue burden. There is no indication of the amount of catalyst required, or the reaction temperature and pressure in the gas phase reactor.

A calculation based on the amount of polymer produced in each of the three reactors indicates that the specified split between high and low molecular weight

fractions is not achieved. In Example 2, a total of 1.9 plus 30 plus 69 kg PE/hour, that is, 100.9 kg PE/hour is produced in the three reactors.

An absolute value of molecular weight does not exist, the value depending on the method chosen. There are various methods available. GPC is unreliable and inconsistent and, as shown in document D34, gives rise to results which may fall within or outside the claimed range.

Whilst the patent in suit refers to measuring tensile modulus according to ISO 527.2, there is no indication as to which of the forms of test specimen should be used, or how the specimen should be prepared. As indicated in document D29, the choice of test specimen affects the measured tensile modulus.

It is not clear whether the ESCR property as specified in claim 4 is measured on the container or the polymer from which the container is made. It is noted that the thermal history of the sample is relevant to the value of ESCR. Whilst document D28 assumes that the ESCR values were taken from a polymer sample, the patent in suit indicates that the measurements should be carried out on the container.

The person skilled in the art thus does not have sufficient guidance to select a polymer having the specified properties, so that the requirements of Article 83 EPC are not satisfied.

Reasons for the Decision

Main Request

1. *Admissibility*

In the annex accompanying the invitation to oral proceedings, it was indicated that any further submissions from the parties should be filed at least one month before the date set for oral proceedings. This date fell on a Sunday, so that the main request of the appellant, which was filed on the following Monday, is regarded as having been filed within the specified period.

The appellant had altered their requests a number of times during the procedure before the opposition division and during the appeal proceedings. Whilst this might be regarded as somewhat exasperating for the respondents, it is not considered relevant to the question of admissibility of the request at present under consideration.

The features of the claims of the main request were all present in the claims as granted.

Accordingly, the Board finds it appropriate to exercise their discretion to admit the late filed main request into the proceedings in accordance with Article 114(1) EPC.

As regards the late filed documents, numbered as documents D35 to D42, introduced by the appellant with submissions dated 14 November and 10 December 2008,

documents D35 to 37 and 40 to 42 are not considered sufficiently relevant for the present decision that they should be admitted into the proceedings. On the other hand, documents D38 and D39 are merely extracts from a well known encyclopedia and handbook respectively, which are regarded as representing the background knowledge of the person skilled in the art.

2. *Amendments*

In the application as filed (published version), there is disclosed at page 2, lines 4 to 10 and 23 to 27, the use of bimodal high density polyethylene (HDPE) for forming large volume containers by blow moulding. The polyethylene components of the bimodal HDPE may either all be ethylene copolymers, or an ethylene homopolymer may be one of the components. Preferred characteristics of the bimodal HDPE used in the process of the invention are disclosed at page 6, lines 14 to 26. For the skilled reader, it is clear that these characteristics are those of the bimodal HDPE as discussed at page 2.

The subject-matter of claim 1 is thus disclosed in the application as filed and the requirements of Article 123(2) EPC are accordingly satisfied.

3. *Sufficiency of Disclosure*

3.1 Molecular Weight

Claim 1 specifies that the bimodal HDPE has values of weight average molecular weight, number average molecular weight, and molecular weight distribution

falling within specified ranges. The respondents allege that the disclosure of the patent in suit is insufficient in this respect.

Example 2 of the patent in suit describes a method of preparation of a bimodal HDPE. The polymerisation process is carried out in first and second loop reactors followed by a gas phase reactor.

In the first loop reactor operating at a temperature of 85°C and a pressure of 65 bar, a catalyst, prepared as described in Example 1, is introduced at a rate sufficient to produce polyethylene (PE) at about 1.9 kg/h. A slurry is withdrawn from the first loop reactor and fed to a second loop reactor operating at a temperature of 95°C and a pressure of 61 bar, in which 30 kg/h of a low molecular weight polyethylene is produced. Product withdrawn from the second loop reactor is fed to the gas phase reactor, in which a total of 69 kg/h of PE are produced. Finally, it is indicated that the low MW fraction represents 45% of the total polymer.

It was suggested by respondent III that the figures for the amount of polyethylene produced are inconsistent. However, an amount of 30 kg/h of low molecular weight polyethylene represents approximately 43.5% of a total production of 69 kg/h, so that the low MW fraction as disclosed is within 2% of the value calculated on the basis of the hourly production. It is not the case that the total production is arrived at by adding the production of each reactor, since the three reactors are arranged in series.

The Examples are thus consistent in this respect and provide a disclosure of the "split", that is, the proportion of the HDPE constituted by the low and high molecular weight components.

The Examples are silent as regards the temperature in the gas phase reactor. However, the Examples specify the melt flow resistance and density of the product of each stage. The person skilled in the art would be capable of adjusting the temperature in order to achieve the desired product. The person skilled in the art is thus able to choose a suitable operating temperature for the gas phase reactor when carrying out the Examples.

There is also no disclosure in the Examples as to the pressure in the gas phase reactor. There is, however, no evidence to suggest that variation of pressure has any effect on the molecular weight of the product. The absence of a specified pressure thus does not interfere with the working of the Examples.

Claim 1 specifies a weight average molecular weight of 200000 to 450000 D, a number average molecular weight of 6000 to 20000 D, and a molecular weight distribution of 15 to 55. The Examples provide polymers having a weight average molecular weight of 260000 to 370000 D, a number average molecular weight of 7700 to 16000 D, and a molecular weight distribution of 20 to 48. The products of Examples 2 to 5 thus exemplify a large part of the claimed ranges of weight and number average molecular weight and molecular weight distribution.

It is noted that the Tables at page 3 of document D34 show that the choice of different conditions for the GPC test method can give rise to results suffering from significant discrepancies for five commercially available polyethylenes. It is suggested on behalf of the respondents that these discrepancies give rise to a high level of uncertainty as to the selection of a bimodal HDPE suitable for carrying out the claimed invention. It is, however, noted that the tests of document D34 are not carried out on the bimodal HDPE of the Examples of the patent in suit.

It is further noted that, as stated in document D24, at page 617, that GPC is merely a secondary method of molecular weight determination, which requires suitable calibration using, for example, laser light scattering. Document D34 thus does not provide any evidence to the effect that the person skilled in the art would be unable to know whether or not polymers produced in accordance with the Examples of the patent in suit have the desired molecular weight. In particular, a suitably calibrated GPC test method could be applied.

Whilst the respondents suggest that GPC methods are unreliable, this is in contradiction to the wide use of the method in industry. Further, whilst it is accepted that a considerable level of expertise is required to obtain reliable values using GPC test methods, this does not constitute an undue burden.

Finally, it is noted that, as accepted by the appellant, the specified values of molecular weight and molecular weight distribution are those of materials which are known in the art for commercially available resins, as

indicated in document D38 at page 3531, first paragraph, left hand column and document D39, page 10, first paragraph. The disclosure is thus not concerned with an exotic material with which the person skilled in the art is not familiar.

The Board thus comes to the conclusion that the person skilled in the art is capable of working the Examples of the patent in suit and thereby obtaining bimodal HDPEs having the properties set out in Table 1 of the patent in suit, in particular, as regards weight and number average molecular weight and molecular weight distribution.

3.2 Tensile Modulus

According to the patent in suit (see footnote to paragraph [0036]), tensile modulus is measured according to the procedure specified in ISO 527-2 (document D22).

Document D22 sets out three different methods of obtaining a specimen for testing, that is, either moulded or machined, cut or punched to the desired dimensions from injection moulded or compression moulded plates (paragraph 1.3). The test is carried out on dumbbell-shaped specimens having either the dimensions of type 1A or 1B (see paragraph 6.1 and Figure 1), depending on whether the specimen is directly moulded or cut from a larger plate.

Document D29 demonstrates that different values of tensile modulus result from the choice of method of preparation of the specimen. However, the claims of the

patent in suit merely require that the tensile modulus is at least 900 MPa. As set out in Table 1 of the patent in suit, following the procedure of the Examples results in products having such tensile moduli.

The person skilled in the art is thus enabled to prepare HDPE polymers having a tensile modulus of at least 900 MPa.

3.3 ESCR F_{50}

Claim 4 is directed to a blow-moulded container having an ESCR F_{50} of at least 500 hours. This is construed as referring to a blow-moulded container made of a bimodal HDPE having an ESCR F_{50} of at least 500 hours. It is not accepted that the reference to "ASTM D1693, condition B" at page 5, line 32 of the patent in suit should simply be ignored and stress cracking tests carried out on a container, rather than the specimen as specified in the standard.

According to the patent in suit (see paragraphs [0019] and [0035]), ESCR is measured according to the procedure specified in ASTM D1693 (document D23), condition B, 10% Igepal. This procedure involves exposing a bent specimen having the dimensions specified in Table 1 of document D23 and having a notch in one face to a surface active agent. Such a test, involving bending of a sample having a defined shape as illustrated on page 377 of document D23, cannot be carried out on a container.

Whilst paragraph [0019] of the patent in suit attempts to compare tests carried out in accordance with ASTM D-

1693 with tests carried out on small containers in document D12, it was accepted by the appellant during oral proceedings that such a comparison was not valid. As stated in document D12 at page 7, lines 55 to 59, the tests were carried out on a partly filled bottle under pressure.

The Examples of the patent in suit thus provide sufficient information to enable the person skilled in the art to manufacture containers having an ESCR F_{50} value of at least 500 hours. Indeed, ESCR F_{50} values of over 1000 hours may be obtained by following the teaching of Examples 3 to 5, as set out in Table 1 in paragraph [0036] of the patent in suit.

3.4 The patent in suit thus provides sufficient teaching to enable the person skilled in the art to produce a bimodal HDPE which satisfies the criteria specified in claim 1, which can be blow moulded so as to form a polyethylene container of at least 2L volume and having the desired properties of impact resistance, stiffness and environmental stress crack resistance, and to manufacture a container as specified in claim 4.

The requirements of Article 83 EPC are thus satisfied.

4. The Opposition Division has not had the opportunity of assessing the issues of novelty and inventive step. Therefore, in order to enable these issues to be examined by two instances, the Board exercises its discretion under Article 111(1) EPC to remit the case to the Opposition Division for further prosecution.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance for further prosecution.

The Registrar: The Chairman:

D. Meyfarth W. Zellhuber