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D E C I S I O N
of 22 October 2004

Case Number: T 1075/01 - 3.3.3

Application Number: 93921509.1

Publication Number: 0662988

IPC: C08L 23/04

Language of the proceedings: EN

Title of invention:
Soft films having enhanced physical properties

Patentee:
ExxonMobil Chemical Patents Inc.

Opponent:
The Dow Chemical Company

Headword:
-

Relevant legal provisions:
EPC Art. 54, 111(1)

Keyword:
"Late-filed material (partially admitted)"
"Priority (not valid)"
"Interpretation of parameter"
"Novelty (yes)"
"Inventive step - remittal"

Decisions cited:
T 0326/87, T 1002/92, T 0793/93

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1075/01 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 22 October 2004

Appellant: (Opponent)	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: (Proprietor of the patent)	ExxonMobil Chemical Patents Inc. 5200 Bayway Drive Baytown TX 77520-5200 (US)
Representative:	Dörries, Hans Ulrich, Dr. Dörries, Frank-Molnia & Pohlman Triftstrasse 13 D-80538 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office dated 12 July 2001 and posted 1 August 2001 rejecting the opposition filed against European patent No. 0662988 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: R. Young
Members: W. Sieber
H. Preglau

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 662 988, in respect of European patent application no. 93 921 509.1, based on International application no. PCT/US93/08586, filed on 13 September 1993 and claiming a US priority of 16 September 1992 (US 945769), was published on 12 February 1997 (Bulletin 1997/07). The granted patent contained 16 claims, whereby the independent claims read as follows:

"1. A polymer composition comprising a mixture of:

a) 25 to 90% by weight, based on polymer content, of a copolymer of ethylene and a C_4 to C_{20} alpha-monoolefin comonomer, said copolymer having a density of from 0.88 to 0.925 g.cm^3 [*sic*], a melt index of from 0.5 to 7.5 dg/min, a molecular weight distribution of not greater than 3.5 and a compositional distribution breath index greater than 70 percent, and

b) 10 to 75% by weight, based on polymer content, of a low to medium density ethylene polymer having a density in the range of from 0.910 to 0.935 g/cm^3, a melt index of from 0.5 to 20 dg/min, a molecular weight distribution above 3.5 and a compositional breath index of less than 70%.

2. A method of reducing draw resonance during the production of polyolefin film material comprising:

i) forming a polymer mixture in accordance with claim l;

ii) melt extruding said mixture at a temperature of up to 288°C into a nip formed by a casting roll and a pressure roll, and

iii) taking-up said film from said casting roll at a linear speed in excess of 254 cm/sec.

3. A film prepared from the composition of claim 1 or the method of claim 2.

14. An article of manufacture made from the film of claim 2 or 3."

Claims 4 to 13, 15 and 16 were dependent claims.

II. A notice of opposition was filed on 12 November 1997 by The Dow Chemical Company, requesting revocation of the patent in its entirety on the grounds of Article 100(a) EPC, ie lack of novelty and lack of inventive step. The opposition was – *inter alia* - supported by the following documents:

D1: US-A-4 429 079;

D2: US-A-3 645 992;

D3: *B.K. Hunter et al*, "The Preparation and Characterization Homogeneous Copolymers of Ethylene and 1-Alkenes", Journal of Polymer Science, Polymer Chemistry Edition, 22, pages 1383-1392 (1984);

D4: *N. Kuroda et al*, "Sequence and Branching Distribution of Ethylene/1-Butene Copolymers prepared with a Soluble Vanadium-Based Ziegler-Natta Catalyst", Macromolecules, 25 (No. 11), pages 2820-2827 (1992);

D5: EP-A-0 600 425;

D7: *M. Tanaka*, "High Value Added Film Using an Olefin Based Elastomer", Speciality Plastics Conference, Zürich (1990);

D8: *K. Tominari*, "Special Applications and Markets for Ethylene Alpha-Olefin Copolymers in Japan", Speciality Plastics Conference, Zürich (1986);

D9: US-A-5 283 128;

D12: WO-A-90/03414;

D13: *K.K Dohrer et al*, "Resistance to Draw Resonance of Linear Low Density Polyethylene through Improved Resin Design", Society of Plastics Engineers, 47th Annual Technical Conference & Exhibits (1989);

D14: US-A-4 339 507;

as well as the later filed, but admitted documents:

D17: *D.G.F. van der Sanden et al*, "A new family of linear ethylene polymers provides enhanced sealing performance", Tappi Journal, pages 99-103 (February 1992);

D18: Affidavit of P.N. Georgelos dated 21 October 1997;

D19: Product information sheet TAFMER® "A" (1977);

D20: Affidavit of F.J. Stehling dated 6 February 1991; and

D23: Test Report dated 29 September 1999.

III. By a decision which was announced orally on 12 July 2001 and issued in writing on 1 August 2001, the opposition division rejected the opposition since the subject-matter of the granted claims was novel and inventive in view of the cited prior art.

As regards D1, it was held that the polymers prepared in Example 1 of D1 did not disclose all the parameters required in granted Claim 1. The opponent could not unambiguously demonstrate that the missing parameters were inherent to the polymers produced in Example 1. Since, furthermore, the opponent did not bring convincing evidence in form of own experiments, novelty over D1 was acknowledged. Also D19 did not disclose a composition having all the parameters required in Claim 1 of the patent in suit. Again, the opponent could not clearly demonstrate that the blend mentioned in Figure 4 of D19 anticipated the claimed subject-matter.

D13 was considered to represent the closest prior art. It dealt with the problem of reducing draw resonance of polyethylene films while maintaining the strength properties. The problem of the patent in suit was to

reduce draw resonance of low density or medium density polyethylene (LDPE or MDPE) film in order to maximize the rate of film production at a uniform thickness. The solution, ie a blend of LDPE or MDPE with very low density polyethylene as claimed in granted Claim 1, was not obvious from the cited prior art. Even when starting from D12 or D14, the claimed subject-matter was not obvious from the cited prior art.

IV. On 28 September 2001, the opponent (hereinafter referred to as the appellant) filed a notice of appeal against the above decision with simultaneous payment of the prescribed fee.

With the statement of grounds of appeal, filed on 10 December 2001, the appellant filed the following documents:

D24: Encyclopedia of Polymer Science and Engineering, Volume 6, John Wiley & Sons, 1986, pages 386 to 400; and

D25: *T.C. Yu et al*, Presentation at the Polyolefins VIII International Conference held in Houston, Texas, in February 1992.

Following a communication from the board, issued on 4 August 2004, accompanying a summons to oral proceedings, the appellant filed, on 22 September 2004, the following further documents:

D23A: Corrected Test Report;

D27: US-A-5 376 439 (US equivalent to the patent in suit);

D28: USSN 945769 (priority document of the patent in suit);

D29: CDBI values obtained for three different CDBI definitions;

D30: Second Experimental Report;

D30A: Letter from ExxonMobil concerning CDBI data relied upon in D30;

D30B: EP-B-0 699 219 (front page, page 5);

D30C: Declaration of P. German (front page, pages 1 and 11);

D30D: Table 1;

D30E: Table 2;

D31A: US prosecution, examiner's action of 14 June 1993;

D31B: US prosecution, applicant's response of 9 July 1993;

D31C: US prosecution, examiner's subsequent action of 13 October 1993;

D31D: US prosecution, applicant's subsequent response of 14 February 1994;

D32: Letter of Exxon Chemical Company dated 26 October 1992 on release of 10 Exact® grades;

D33: Product Brochures on Exact®3025, Exact®3026, Exact®3027 and Exact®3028;

D34: Product Brochure on Exact®4011;

D35: Brochure "Exact® Polymers - For Targeted Performance in Film Packaging"; and

D36: *B.C. Trudell et al*, "Single Site Catalyzed Ethylene Copolymers: Structure/Property Relationships", ANTEC 92, pages 613 to 617.

In the written submissions, the appellant argued in essence as follows:

(a) In the application as originally filed and in the patent in suit, respectively, the compositional distribution breath index (CDBI) of components a) and b) had a definition that was not consistent with its definition in the priority document D28. Due to this different definition of CDBI, the patent in suit described different groups of polymers from those disclosed in the priority document. Consequently, the patent in sit was no longer entitled to the claimed priority date of D28.

(b) According to the patent in suit (page 5, lines 29 to 37), a polyethylene homopolymer, namely a high pressure LDPE, could be used as component b). In

fact, all the examples in the patent in suit used LDPE as component b). Although the patent in suit referred at page 4, lines 8 to 13 to the technique of Temperature Rising Elution Fraction (TREF) with respect to the measurement of CDBI, it did not provide any guidance how to obtain a CDBI for the rather complex structure of LDPE having a range of short chain branches of different lengths. Thus, a person skilled in the art neither knew which type of branch would apply nor could he verify the CDBI parameter for LDPE, because the patent in suit did not indicate a CDBI for LDPE (neither in the description nor in the examples). Thus, the CDBI parameter was irrelevant for high pressure LDPE.

(c) The compositions and films taught in document D1, and in particular in Example 1 of D1, anticipated the films and compositions claimed in the patent in suit. As regards the parameters not explicitly mentioned in Example 1 of D1, namely the molecular weight distribution (M_w/M_n) and the CDBI of the copolymer (B) (corresponding to component a) in the patent in suit) and the CDBI of the polymer (A) (corresponding to component b) of the patent in suit), the narrow M_w/M_n and the narrow CDBI of copolymer (B) of Example 1 were conclusively evidenced by D5, D17, D2, D3 and D4, whereas D20 provided conclusive evidence that the polymer (A) of Example 1 of D1 had a CDBI as required in Claim 1 of the patent in suit. Thus, the polymers disclosed in Example 1 of D1 inherently had the parameters required in Claim 1 of the patent in suit. Relying on D5, D17, D2, D3, D4 and D20 could not be construed as an impermissible combination

of documents in the assessment of novelty since these documents were merely cited to substantiate the appellant's position that a single prior art document, ie D1, provided a clear and unmistakable disclosure of the compositions and films claimed in the patent in suit. In view of this convincing evidence, there was no need for the opponent to bring further evidence in form of own experiments, so that the opposition division's criticism in this respect was not justified.

(d) D19 disclosed in Figure 4 a blend of 30% Tafmer®A-4085 and 70% LDPE. Tafmer®A-4085 was a copolymer that met all the requirements of component a) of granted Claim 1 as evidenced by D7 to D10, D18, D23 and D23A, respectively. As regards the missing parameter M_w/M_n of LDPE, which was not disclosed in D19, the appellant submitted that LDPEs typically had a M_w/M_n above 3.5. In this context, reference was made to D24.

(e) In its first letter, the appellant argued that the claimed subject-matter was not inventive over D13 or D14 in combination with D11, D25 or the general knowledge of the skilled person regarding the newly developed metallocene-made resins, in particular Exact® resins.

Since the appellant had experienced difficulties in evaluating the claimed invention given the lack of any data on CDBI parameter (but also on M_w/M_n) in the working examples of the patent in suit, and in particular what contributions were due to what parameter, the appellant had performed a number of

blending experiments preparing blends according to D14, the closest prior art, and blends according to the patent in suit and compared these blends under identical conditions (D30). The tests showed that the alleged benefits for most of the claimed blends, ie reduction of draw resonance, were not achieved. Consequently, the key problem underlying the invention was not solved, at least not throughout the whole breadth of the claims. Thus, it was not clear what could be identified as objective problem to be solved by the claimed subject-matter.

V. The proprietor (hereinafter referred to as the respondent) provided its counterarguments in a letter filed on 17 June 2002 and a letter filed on 22 September 2004. The arguments can be summarized as follows:

(a) The appellant's assessment of novelty in view of D1 and D19 was based on an inadmissible combination of documents.

(b) Apart from that, it had not been demonstrated that each and every feature of Claim 1 of the patent in suit was disclosed in D1 or was at least the inevitable result of the process of Example 1 of D1. Also none of the additional documents could demonstrate that the process conditions applied in D1 for the copolymer preparation inevitably led to polymers exhibiting each and every feature of component a) and b) of the claimed composition.

(c) As regards the novelty objection based on D19, neither D19 alone nor in combination with D7, D8, D9, D23 and D24 directly and unambiguously disclosed each and every feature of granted Claim 1.

(d) The technical problem underlying the invention had to be seen in the provision of polymer compositions for film applications exhibiting reduced draw resonances while maintaining good tensile and elongation properties. The solution to this problem, namely the polymer blend of Claim 1, was not obvious from D13 (alone or in combination with D11, D25 or the general knowledge of the skilled person regarding Exact® resins) or D14 (alone or with any other reference on file).

(e) Regarding the CDBI of LDPE, the respondent argued that the composition distribution and thus the CDBI related to short chain branching of polymers. This could be determined on polyethylene as apparent from D26, submitted therewith.

D26: *L. Wild et al*, "Determination of Branching Distributions in Polyethylene and Ethylene Copolymers", J. Poly. Sci., Poly. Phys. Ed., vol. 20, pages 441 to 455 (1982).

(f) In its letter filed on 22 September 2004, the respondent filed a first, second, third and fourth auxiliary request.

VI. In a letter filed on 15 October 2004, the appellant expressed its surprise that the respondent challenged in the letter filed on 22 September 2004 that Tafmer®A-4085 met the requirements of component a) of granted Claim 1. In view of this, it provided further data (in the form of an annexed email) on the Tafmer®A-4085 sample that was analyzed in D23 and D23A, respectively. It was said that this sample was manufactured prior to August 1992 and had, *inter alia*, a melt index of 3.96, a density of 0.8863 and a M_w/M_n of 2.0.

VII. The respondent filed on 19 October 2004 an amended set of auxiliary requests, namely first to fifth auxiliary request. Furthermore, it requested that all documents filed by the appellant during the appeal proceedings as well as the data submitted on 15 October 2004 concerning Tafmer®A-4085 be rejected as being late-filed.

The respondent submitted that Tafmer®A-4085 did not fall within the definition of component a) of Claim 1 and that there were actually many differences between Tafmer®A-4085 and a metallocene-prepared copolymer such as component a) according to Claim 1 of the patent in suit.

VIII. On 22 October 2004, oral proceedings were held before the board. The issues discussed at these oral proceedings related to the validity of the claimed priority, the meaning of CDBI with respect to high pressure LDPE and novelty of the claimed subject-matter vis-à-vis D1 and D19, whereby both parties basically relied on their detailed written submissions.

With respect to the late-filed documents, the respondent accepted that the priority document, D28, was in the proceedings and, therefore, did not pursue the exclusion of this document. The appellant did not pursue D25, D30B and D36. D27, D29, D31A, D31B, D31C and D31D had not proved to be of importance to the present case and were excluded from consideration. D23A, D24, D30, D30A, D30C, D30D, D30E, D32, D33, D34 and D35 were admitted into the proceedings for consideration. The content of the email referred to in the letter filed on 15 October 2004 could not be disregarded as such because it was part of a letter to the board. As to the data it presented, these had been evaluated on the basis of the principle of free evaluation of evidence by the board.

Since some of the late-filed documents were admitted into the proceedings, and in particular D30, the respondent expressed its wish that the case be remitted to the opposition division for consideration of inventive step.

IX. The appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondent requested that the appeal be dismissed and the patent be maintained as granted (main request), or in the alternative, that the decision under appeal be set aside and the patent be maintained in amended form on the basis of one of the auxiliary requests (first to fifth), all filed on 19 October 2004.

The respondent also requested that documents D23A, D24, D25, D27, D29, D30, D30A, D30B, D30C, D30D, D30E, D31A, D31B, D31C, D31D, D32, D33, D34, D35, D36 and the data presented in the appellant's letter filed on 19 October 2004 be excluded as being late-filed.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 EPC and Rule 64 EPC and is therefore admissible.

2. *Late-filed documents*

2.1 Documents D23A, D24, D25, D27, D28, D29, D30, D30A, D30B, D30C, D30D, D30E, D31A, D31B, D31C, D31D, D32, D33, D34, D35 and D36 are new evidence submitted by the appellant either with the statement of grounds of appeal (D24, D25) or with the letter on 22 September 2004 for the first time. The appellant sought to justify the introduction of the latter on the grounds of the change of representation, the rather late recognition of the invalidity of the priority date and the lack of the relevant data in the examples of the patent in suit, namely the parameters compositional distribution breadth index (CDBI) and molecular weight distribution (M_w/M_n), necessitating a different approach to inventive step and the conducting of further experiments. The respondent requested that all newly cited documents, except D28, should not be admitted into the proceedings because of their lateness and insufficient relevance.

2.2 D23A and D24 were cited by the appellant in connection with its novelty objection. D23A is a corrected version of the test report D23 which has been considered by the opposition division, and D24 is an excerpt from a standard textbook, which has been filed already with the statement of grounds of appeal. Both D23A and D24 are *prima facie* clearly relevant with respect to the appellant's novelty objection based on inherent disclosure of parameters of prior art products and were, therefore, admitted into the proceedings.

2.3 As regards, D25, D30B and D36, the appellant stated at the oral proceedings before the board that it did not further rely on these documents. Hence, there was no need for the board to decide on the introduction of these documents.

2.4 Documents D27, D29, D31A, D31B, D31C and D31D have not proved to be of importance to the present case and were excluded from consideration (Article 114(2) EPC).

2.5 D28 is the priority document of the patent in suit and is part of the proceedings anyway.

2.6 D30, D30A, D30C, D30D, D30E, D32, D33, D34, and D35 are intended to support the appellant's inventive step objection. From the appellant's submissions of 22 September 2004, it is apparent that the experiments carried out in D30 give rise to doubts as to whether the problem envisaged by the patent in suit, ie reduction of draw resonance during the production of polyolefin film material, is solved by the polyolefin compositions claimed in Claim 1. D30A, D30C, D30D and D30E relate to the data presented in D30. Furthermore,

due to the lack of entitlement to priority (section 3, below), certain commercial Exact® grade products become relevant prior art since those grades were available to the public at the filing date of the international application on which the patent in suit is based, and had the density, melt index (MI), M_w/M_n and CDBI of component a) of Claim 1 as demonstrated by D32, D33, D34, and D35. In the board's view, all these documents are highly relevant in the sense that it is highly likely that they prejudice maintenance of the patent in suit. Thus, in accordance with T 1002/92 (OJ EPO 1995, 605), these documents were introduced into the proceedings.

2.7 The email annexed to the letter filed on 15 October 2004 is part of a letter to the board and cannot, therefore, be disregarded a such. Having regard to the numerical data it contains, these serve only to supplement the information given in the test report D23A, which is in any case part of the proceedings. The board sees *a priori* no reason to give less credence to this information than it would to the remainder of the test report. It is therefore admitted into the proceedings as part of D23A. The data were evaluated by the board on the basis of the principle of free evaluation of evidence.

2.8 In view of the above considerations, the board decided to admit D23A, D24, D30, D30A, D30C, D30D, D30E, D32, D33, D34 and D35 into the proceedings.

3. *Priority*

3.1 The Exact® grade products referred to by the appellant (D32 to D35) were commercialized, ie made available to the public, between the priority date (16 September 1992) and the filing date (13 September 1993) of the patent in suit. Consequently, when considering the relevance of the late-filed documents D32 to D35 it is also necessary to decide on the question as to whether the priority date is validly claimed.

3.2 In the patent in suit, both copolymer a) and copolymer b) have to have a certain CDBI parameter. As pointed out by the appellant, this parameter has in the priority document a meaning that is not consistent with the CDBI definition in the application as originally filed and in the patent in suit, respectively.

3.2.1 The CDBI parameter has been defined in the priority document at page 7, lines 31 to 34 as follows:

> *"The CDBI is defined as the weight percent of the copolymer molecules having a comonomer content within 50 percent (i.e. ±50%) of the median total molar comonomer content."*

3.2.2 In the application as originally filed (page 5, lines 18 to 20) and in the patent in suit itself (page 4, lines 8 to 10), the same parameter is defined as [underlining added by the board]:

> *"CDBI is defined as the weight percent of the copolymer molecules having a comonomer content within 50 percent (that is, 25% on each side) of the median total molar comonomer content."*

3.2.3 This means that in the application as originally filed and in the patent in suit, respectively, the CDBI is the difference between the values of the cumulative integral at compositions 0.75 C_{med} and 1.25 C_{med}. This is a different definition from that in the priority document where the CDBI of the copolymer is the difference between the values of the cumulative integral at compositions 0.5 C_{med} and 1.5 C_{med} (page 11, lines 2 to 24). Thus, if the CDBI has to be greater than 70%, more than 70% of the polymer should have a comonomer content within 0.5 C_{med} to 1.5 C_{med} in the priorty document whereas for the patent in suit more than 7O% of the polymer should have a comonomer content within the range of 0.75 C_{med} to 1.25 C_{med}.

3.2.4 With respect to copolymer a) of Claim 1, this means that, at the same CDBI value of 70%, the patent in suit requires a significantly narrower composition distribution compared to the priority document. Or in other words, the changed definition has a significant influence on the CDBI value.

3.3 The consequence of the changed definition is that the claims are no longer entitled to claimed priority, since the invention claimed in the patent in suit differs from the one described in the priority document. Therefore, the patent in suit can only rely on the international filing date.

4. *CDBI parameter with respect to LDPE / interpretation of Claim 1*

4.1 According to page 5, lines 29 to 37 of the patent in suit, component b) of Claim 1 is a medium to low density ethylene polymer having - *inter alia* - a CDBI of less than 70%. Such a polymer may be prepared by conventional high pressure polymerization processes using free radical catalyst systems. The preferred polymers are low density polyethylene (LDPE) as well as low density copolymers of ethylene with up to 30 mole% of a comonomer. In other words, component b) encompasses a high pressure LDPE 'homopolymer', ie a polymer where no comonomer has been used in its production. While the appellant accepted the concept of CDBI for true ethylene copolymers, it argued that this concept was not applicable to LDPE.

4.2 As is apparent from D14 (column 1, lines 23 to 33), "[t]he molecular structure of high pressure, low density polyethylene is highly complex. The permutations in the arrangement of its simple building blocks are essentially infinite. High pressure, low density polyethylene resins are characterized by an intricate long chain branched molecular architecture. These long chain branches have a dramatic effect on the melt rheology of the resins. High pressure, low density polyethylene resins also possess a spectrum of short chain branches, generally 1 to 8 carbon atoms in length, which control resin crystallinity (density)". Thus, although no comonomer has been used in the production of high pressure LDPE, the short chain branches of LDPE could be viewed as representing comonomer units. But there is not one fixed short chain branch length

representing one 'comonomer' but rather a range of short chain branches of different lengths representing several 'comonomers'. However, it is not taught in the patent in suit how to calibrate the TREF method when determining the CDBI of LDPE. In other words, a skilled person does not know for which 'theoretical' comonomer the TREF method has to be calibrated. It is also not clear whether the long chain branches are to be disregarded or included in the CDBI determination. Furthermore, the patent in suit itself does not indicate the CDBI for the LDPE used in the examples.

4.3 In view of the above, the board agrees with the appellant that the CDBI parameter does not have a clear meaning when component b) of Claim 1 is a high pressure LDPE. Consequently, the reference to a CDBI of less than 70% for component b) has to be ignored in the case that component b) is a low to medium density LDPE homopolymer prepared by high pressure polymerization.

5. *Novelty over D1 (main request)*

5.1 Disclosure of D1 itself

5.1.1 D1 is directed to compositions comprising a mixture of two random ethylene/α-olefin copolymers (A) and (B). Example 3 specifically discloses a composition of 70 wt.% of an ethylene/4-methyl-1-pentene copolymer (A) and 30 wt.% of an ethylene/1-butene copolymer (B) where copolymer (A) has a melt index (MI) of 2.3 g/10 min, a molecular weight distribution (M_w/M_n) of 3.6 and a density of 0.920 g/cm^3 and copolymer (B) has a MI of 4.0 g/10 min and a density of 0.890 g/cm^3. Thus, copolymer (A) of D1 may be regarded as corresponding to

component (b) of the patent in suit and copolymer (B) of D1 may be regarded as corresponding to component (a) of the patent in suit.

Examples 4 and 6 of D1 disclose the preparation of films of a 50:50 blend of the same copolymers (A) and (B) used in Example 3. Examples 5 (70:30 blend) and 7 (50:50 blend) disclose the preparation of films in the same way as in Examples 3 and 6 except that an ethylene/1-octene copolymer (MI 1.01, density 0.930, M_w/M_n 4.4) was used instead of the ethylene/4-methyl-1-pentene copolymer.

However, neither D1 in general nor Examples 3 to 7 in particular mention the CDBI of the copolymer (A) and the parameters M_w/M_n and CDBI for copolymer (B). Thus, the disclosure of D1 does not, at least not explicitly, disclose a composition having all the parameters required in Claim 1 of the main request.

5.1.2 Nevertheless, the appellant took the view that the missing parameters were inherent to the components employed in Examples 3, 4, 5, 6 and 7 of D1 and relied on further documents to substantiate its position in this respect, namely D20 (with respect to the missing CDBI parameter of copolymer (A) of D1), and D5, D17, D2, D3 and D4 (with respect to the the missing parameters M_w/M_n and CDBI of copolymer (B) of D1).

5.2 Disclosure of D20

5.2.1 According to the appellant, the copolymer (A) produced in Example 3 of D1 had, due to the use of a multi-site catalyst system (a heterogeneous titanium-based $MgCl_2$

supported catalytic system of titanium tetrachloride and diethyl aluminium chloride), inevitably a CDBI of less than 70% as demonstrated by document D20.

5.2.2 D20 is an affidavit by F. Stehling, an employee of the Exxon Chemical Company which was submitted during examination of a US application corresponding to D12, which names Stehling as the first inventor. The purpose of this affidavit was to prove that the polymer blends of D12, which are composed of ethylene copolymers having a CDBI of at least 50% or more, were patentable over the blends known from "Shibata", corresponding to D1. Stehling states:

> *"Based upon my expertise and working knowledge of the catalysts and processes disclosed in the production of Component A of Shibata, I can conclude that such catalysts and processes do not produce copolymers having a composition distribution breath index of at least 50%." (page 3, section 8)*

In other words, Stehling testifies that the catalysts and process conditions disclosed in D1 for the production of copolymer (A) produce copolymers having a CDBI of less than 50%, and, by implication, of less than 70%. Since D20 refers "to the catalysts and processes disclosed in the production of Component A" in this general form, it can, in the board's view, safely be concluded from D20 that a CDBI of less than 70% is always and inevitably obtained when using catalysts and process conditions as mentioned in eg Example 3 of D1 with respect to component (A) of D1 (column 7, lines 12 to 39).

5.2.3 Consequently, copolymer (A) of Example 3 of D1 has the same combination of features as copolymer b) of Claim 1 as granted.

5.3 Disclosure of D5, D17, D2, D3, D4

5.3.1 In contrast to copolymer (A), copolymer (B) of D1 is produced by a different catalyst, namely a vanadium oxychloride catalyst used in combination with an ethyl aluminium sesquichlorid cocatalyst (column 7, lines 51 to 55 in combination with column 9, lines 3 to 6). This type of catalyst produces, according to the appellant, homogeneous copolymers with a narrow M_w/M_n and a high CDBI as required for copolymer a) in the patent in suit. This was evidenced by D5, D17, D2, D3 and D4.

5.3.2 D5 is directed to a film suitable for packaging comprising a homogeneous single site catalyzed copolymer of ethylene and an α-olefin, said single site catalyzed copolymer having limited long chain branching. The passage at page 3, lines 47 to 54, states that the soluble vanadium based Ziegler-Natta catalytic system $VOCl_3/Al_2(C_2H_5)_3Cl_3$ (ie the catalytic system used in the production of copolymer (B) of D1) acts essentially as a single site catalyst although $VOCl_3$ is not a metallocene. A single site type catalyst contains, as explained in D17 (pages 99 to 100), only one active catalyst site which produces just one type of ethylene polymer molecule with a very narrow molecular weight distribution and compositional distribution. However, these statements in D5 and D17 are of a rather general nature and a particular value for M_w/M_n and/or CDBI is not associated therewith.

5.3.3 D2 discloses a process for the preparation of homogeneous random partly crystalline copolymers of ethylene with other α-olefins. The polymers have a narrow M_w/M_n and a homogeneity index of at least 75% and are prepared with vanadium oxy catalysts, *inter alia* the specific catalyst used in Example 3 of D1. According to the appellant, the fractionation study in Table XII of D2 shows that a homogeneous ethylene/1-butene copolymer would have a CDBI of 100%. However, as pointed out by the respondent, the fractionated copolymer of Table XII has a MI of 20.2 which is much higher than the MI reported for copolymer (B) in Example 3 of D1 (MI=4.0) and even outside the scope of copolymer a) of the patent in suit. Furthermore, Table I of D2 shows that a vanadium oxy catalyst can also produce less homogeneous copolymers. Consequently, no definite conclusion can be drawn from D2 as to the true nature of the parameters M_w/M_n and CDBI of copolymer (B) in Example 3 of D1.

5.3.4 D3 relates to the preparation and characterization of homogeneous copolymers of ethylene and 1-alkenes and mentions – among other catalysts – also a catalyst of the type used in Example 3 of D3, ie a vanadium oxychloride catalyst used in combination with an ethylaluminum chloride cocatalyst (page 1383). On page 1386 it is stated:

> *"M_w/M_n for copolymers prepared in the presence of homogeneous Et_3-Al_2Cl_3-$VOCl_3$ catalyst systems was typically 2.0 ± 0.3. "*

Since, furthermore, D3 discloses on page 1387 that the inter-molecular comonomer distribution is very narrow, it can be conclude from D3, according to the appellant, that copolymer (B) of Example 3 has a M_w/M_n and a CDBI as required in Claim 1.

First of all, it is stated on page 1386 of D3 that the M_w/M_n of a copolymer prepared in the presence of the $VOC1_3/Et_3Al_2Cl_3$ catalyst system was **typically** (emphasis by the board) 2.0 ± 0.3, in other words, not always, and not inevitably. It cannot be concluded on a safe basis from D3 that any ethylene/α-olefin copolymer prepared by using the vanadium oxychloride/ethyl-aluminum chloride catalyst system inevitably has a M_w/M_n of less than 3.5. Furthermore, as is evident from the section "Procedure" on page 1384 of D3, the copolymers described in D3 are prepared in a batch process. On the other hand, as is explained in D1, column 7, line 40 to column 8, line 7, the corresponding copolymer in D1 is prepared by a continuous process, namely in a continuous stirred tank reactor. A batch reactor and a continuous stirred tank reactor are quite different reactors. Therefore, the information provided in D3 as to the structural features, such as M_w/M_n, of a specific polymer prepared according to the procedure described in D3, cannot safely be transferred to the reaction conditions employed eg in Example 3 of Dl and the polymer produced therein. This equally applies to the composition distribution.

In summary, no safe conclusion with respect to the M_w/M_n and the CDBI of the polymers disclosed in D1 is possible based on the information provided in D3. Thus, reasonable doubt remains as to these features.

5.3.5 D4 relates to "Sequence and Branching Distribution of Ethylene/1-Butene Copolymers Prepared with a Soluble Vanadium-Based Ziegler-Natta Catalyst". According to the appellant, the branching distribution shown Figure 2 of D4 equates to a CDBI of almost 100% for the ethylene/1-butene copolymer prepared via the $VOCl_3/Al_2(C_2H_5)_3Cl_3$ catalyst. However, D4 does not mention the M_w/M_n. Therefore, D4 does not add anything to the disclosure of D3 as regards the M_w/M_n and the CDBI of the copolymers mentioned therein. In other words, it is not possible to draw a definite conclusion from D4 as to the actual parameters M_w/M_n and CDBI of copolymer (B) in D1.

5.3.6 Finally, with respect to the appellant’s repeated argument that a single-site catalyst (such as the vanadium oxychloride catalyst referred to in D5, D2, D3 or D4) always produces a narrow composition distribution and thus a CDBI of greater than 70%, Example 1 of D12 is worth noting. In this example, an ethylene/l-butene copolymer is prepared using a supported metallocene/alumoxane catalyst system. The resulting copolymer, identified as '013, exhibits an MWD of 2.3 and a CDBI of about 67% (Table 1 on page 20 of D12). This example shows that a metallocene catalyst, ie a single-site catalyst, can produce, in principle, copolymers having a CDBI that is more or less narrow (depending upon the understanding of "narrow" in the specific case), but certainly not copolymers that always and inevitably exhibit a CDBI of greater than 70%.

5.4 In summary, the appellant provided convincing evidence that copolymer (A) prepared in the examples of D1 falls within the definition of component b) of Claim 1. However, it has not been demonstrated beyond reasonable doubt that copolymer (B) prepared in the examples of D1 inevitably falls within the definition of component a) of Claim 1. In deciding what is or is not the inevitable outcome of an express literal disclosure in a particular prior art document, a standard of proof much stricter than the balance of probability, to wit "beyond all reasonable doubt", needs to be applied as pointed out in T 793/93 of 27 September 1995 (not published in the OJ EPO). If any reasonable doubt exists as to what might or might not be the result of carrying out the literal disclosure and instructions of a prior art document, then the case on anticipation based on such a document must fail.

5.5 Consequently, Dl does not anticipate the subject matter claimed in Claim 1 of the main request. Analogously, the subject matter of any of the other independent or dependent claims of the main request, referring either directly or indirectly back to Claim 1, is novel over D1.

6. *Novelty over D19 (main request)*

6.1 Disclosure of D19 itself

6.1.1 D19 is a brochure relating to TAFMER® "A" polyolefin resins, their properties in general and different uses thereof. The brochure provides information regarding different TAFMER® A grades and generally suggests that TAFMER® A grades can be used in blends. In particular,

Figure 4 in D19 discloses a blend of 30% TAFMER®A-4085 with 70% LDPE, whereby TAFMER®A-4085 has a MI of 4.0 g/10 min and a density of 0.88 g/cm^3 (page 4 of D19). Furthermore, Figure 4 contains the statement "Coating of TAFMER®"A"-4085-blended LDPE: MI=6.5; Density=0.917; TAFMER®A-4085 use[?]". The board agrees with the appellant that the values given in Figure 4 relating to MI and density cannot belong to the blend, as argued by the respondent, but must relate to the LDPE component. Because Figure 4 relates to blends having different percentages of TAFMER®A-4085 and LDPE, ie from 0 to 30 wt.% TAFMER®A-4085, and given the density of TAFMER®A-4085 (0.88) and the MI of TAFMER®A-4085 (4.0), the blends in Figure 4 will have densities and melt indices that vary with the blending ratio. Where only one density and MI is given, this number can thus only relate to the LDPE component itself. Nevertheless, Dl9 does not disclose all the parameters required in the patent in suit, namely the M_w/M_n and the CDBI for both TAFMER®A-4085 and the LDPE.

6.1.2 The appellant tries to compensate these defects in disclosure again by consulting further documents which should provide the missing features, such as D18, D7, D8, D9, D23A (for TAFMER®A-4085) and D24 (for LDPE).

6.2 Disclosure of D18, D7, D8, D9, D23A

6.2.1 D18 is an affidavit of Mr. P.N. Georgelos in which it is stated that the polymer products TAFMER®A-1085 and TAFMER®A-4085, both manufactured by Mitsui Petrochemicals Ltd., are ethylene/butene copolymers with a butene content of 11.1%.

6.2.2 D7 relates to various TAFMER grades and their properties. As regards M_w/M_n, D7 only provides the M_w/M_n of TAFMER®A-4090 (Table 2) and not of TAFMER®A-4085 which is used in Figure 4 of D19. In chapter 3 of D7 it is emphasized that "Tafmer is very narrow in molecular weight distribution and also in compositional distribution". A similar statement can be found in D8 (chapter 3.1). However, neither D7 nor D8 provide specific values for M_w/M_n or CDBI of TAFMER®A-4085.

6.2.3 D9 discloses in Table C a M_w/M_n of 2.35 for TAFMER®A-4085. However, D9 is not prior art, since it was published only after the filing date of the patent in suit. Any values provided in D9 regarding the M_w/M_n of TAFMER®A-4085 have to be interpreted with care, since any skilled person knows that technical products and grades may change over time due to adaptations to specific needs for certain applications. It is not unusual for such grades that they change over the years in composition and certain other properties, while the manufacturer keeps the same name for such products, because they are known by that name among the customers. Therefore, it cannot be safely concluded in the present case that the value disclosed in D9 for the M_w/M_n of TAFMER®A-4085 is actually the same M_w/M_n value as exhibited by TAFMER®A-4085 several years earlier in D19.

6.2.4 D23A is a test report concerning the CDBI of TAFMER®A-4085. Firstly, the appellant calculated the CDBI based on Figure 4 of D10 which is the solubility distribution curve of TAFMER®A-4085 generated by solvent fractionation method presented in D10. The CDBI of TAFMER®A-4085 calculates as 72.2%. Secondly, the appellant also determined "experimentally" the CDBI of

a TAFMER®A-4085 sample manufactured prior to August 1992 based on a cold temperature TREF (Temperature Rising Elution Fraction). The CDBI calculates as 86%.

6.2.5 In the letter of 15 October 2004, the appellant stated that the TAFMER®A-4085 sample used for the CDBI determination in D23A was also analyzed with respect to other parameters. It had - *inter alia* - a MI of 3.96, a density of 0.8863 and a M_w/M_n of 2.0. Since, furthermore, the TAFMER®A-4085 sample was manufactured prior to August 1992, these data together with D23A leave, in the board's view, no doubt that TAFMER®A-4085 as used in D19 meets the requirements of component a) of granted Claim 1.

6.2.6 The respondent's argument that TAFMER®A-4085 does not fall within the definition of component a) of Claim 1 and that there are actually many differences between TAFMER®A-4085 and a metallocene-prepared copolymer such as component a) according to Claim 1 of the patent in suit is not convincing because granted Claim 1 does not require that component a) is prepared by a metallocene.

6.2.7 In summary, TAFMER®A-4085 used in the blend of Figure 4 of D19 meets the requirements of component a) of granted Claim 1.

6.3 LDPE component in D19

6.3.1 Turning now to the LDPE component in the TAFMER®A-4085/LDPE blend generally disclosed in Figure 4 of D19, again the CDBI and the M_w/M_n of the LDPE component are not disclosed. However, in view of the finding in section 4, above, the CDBI parameter

requirement of Claim 1 of the patent in suit has to be ignored for the LDPE component. Thus, the question boils down as to whether the LDPE component in Figure 4 of D1 has a M_w/M_n above 3.5 as required in granted Claim 1.

6.3.2 The LDPE used according to Dl9 is not a specific commercial product, and it is not indicated in D19 how or where said LDPE was obtained. Thus, it appears impossible now to arrive at a definite conclusion as to the specific properties of this LDPE.

6.3.3 On the one hand, the appellant argued that LDPE generally has a M_w/M_n above 3.5, at least the commercial grades he was aware of. However, this unsubstantiated statement was challenged by the proprietor which stated at the oral proceedings that LDPE having a M_w/M_n below 3.5 existed.

On the other hand, the appellant tried to argue that D24 provided enough information that would allow the conclusion that any LDPE, in particular the one that is used in the blends of Figure 4 of Dl9 had a M_w/M_n above 3.5. D24 discloses on page 400 that "[t]he autoclave products had a broader molecular weight distribution with an M_w/M_n of 20 vs 12 for the tubular products". However, this is only a very general and vague statement. D24 does not specifically disclose LDPEs having the density and the MI as required for component b) in Claim 1 of the patent in suit. Also, the statement cited above indicates that there is a great variation among M_w/M_n values for LDPEs, depending on how and in which specific reactor the LDPE is

produced without, however, giving a generally accepted lower limit for the M_w/M_n of LDPEs.

6.3.4 In the board's view based on the facts on file, it cannot be determined "beyond all reasonable doubt" that the LDPE that is generally mentioned in Figure 4 of D19 inevitably exhibits a M_w/M_n of greater than 3.5. Consequently, Dl does not anticipate the subject matter of granted Claim 1.

6.4 In summary, neither Dl9 alone nor in combination with references D18, D7, D8, D9, D23A, and D24 directly and unambiguously discloses each and every feature of Claim 1 of the patent in suit. Thus, the subject-matter of Claim 1, and, by the same token, the subject matter of any of the other independent or dependent claims of the main request, referring either directly or indirectly back to Claim 1, is novel over D19.

7. *Novelty of the main request over the other references*

It is evident from the appellant's submissions that Dl and D19 are the only documents on which its novelty objection is based. No further novelty objection was raised by the appellant. Also the board is satisfied that the claims of the main request meet the requirements of Article 54 EPC with respect to the other documents on file.

8. *Inventive step (main request) / remittal*

8.1 The new documents D30, D30A, D30C, D30D, D30E, D32, D33, D34 and D35 change the basic line of argumentation with respect to inventive step and introduce new facts (in

particular D30) thereby changing the factual framework from what it was in the proceedings before the opposition division. In such a situation, the case should normally be referred back to the first instance so as to allow the case to be examined in the light of the new documents at two levels of jurisdiction in order not to deprive the patent proprietor (ie the respondent) of one such level of jurisdiction (T 326/87, OJ EPO 1992, 522). This is especially so when, having regard to the high relevance of the new documents (section 2.6, above), the maintenance of the patent in suit would be at risk.

8.2 Since, furthermore, the respondent expressed a wish for such a remittal, the case is, in the exercise of the board's discretion under Article 111(1) EPC, together with the admitted documents D23A, D24, D30, D30A, D30C, D30D, D30E, D32, D33, D34 and D35, remitted to the first instance for further examination of inventive step.

Order

For these reasons it is decided that:

1. Documents D23A, D24, D30, D30A, D30C, D30D, D30E, D32, D33, D34 and D35 are introduced into the proceedings.

2. The decision under appeal is set aside.

3. The case is remitted to the first instance for further examination of inventive step on the basis of the main request of the respondent, ie Claims 1 to 16 as granted.

The Registrar: The Chairman:

E. Görgmaier R. Young