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**Datasheet for the decision
of 9 August 2007**

Case Number: T 0609/05 - 3.3.03

Application Number: 93304586.6

Publication Number: 0575123

IPC: C08L 23/08

Language of the proceedings: EN

Title of invention:
Ethylene copolymer composition

Patentee:
Mitsui Chemicals, Inc.

Opponent:
ExxonMobil Chemical Patents Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 83, 54, 56

Keyword:
"Partial priority (no)"
"Disclosure - sufficiency (yes)"
"Novelty (yes) - 'multiple selection'"
"Inventive step (yes) - 'problem and solution'"

Decisions cited:
G 0002/98, G 0001/99, G 0001/03, T 0653/93, T 0412/02,
T 0757/03

Catchword:
Reasons 2, 4.



Case Number: T 0609/05 - 3.3.03

DECISION
of the Technical Board of Appeal 3.3.03
of 9 August 2007

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office dated
2 March 2005 and posted 15 March 2005
concerning maintenance of the European Patent
No. 0575123 in amended form.**

Composition of the Board:

Chairman: R. Young
Members: W. Sieber
C. Heath

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 575 123, in respect of European patent application no. 93 304 586.6, in the name of Mitsui Chemicals Inc., filed on 14 June 1993 and claiming eight Japanese priorities, was published on 30 August 2000 (Bulletin 2000/35). The granted patent contained seven claims, whereby Claim 1 read as follows:

"An ethylene copolymer composition comprising:

[A-1] an ethylene/C₃₋₂₀ α -olefin copolymer having the following properties:

- (i) a density (d) of 0.880 to 0.960 g/cm³,
- (ii) a melt flow rate (MFR) at 190°C under a load of 2.16 kg of 0.01 to 200 g/10 min,
- (iii) a temperature (T_m (°C)) at which the endothermic curve of the copolymer measured by a differential scanning calorimeter (DSC) shows the maximum peak and a density (d) which satisfy the relation

$$T_m < 400 \times d - 250,$$

- (iv) a melt tension (MT (g)) at 190°C and a melt flow rate (MFR) which satisfy the relation

$$MT > 2.2 \times MFR^{-0.84},$$

- (v) a flow index (FI (l/sec)) defined by a shear rate which is given when a shear stress of molten copolymer at 190°C reaches 2.4×10^6 dyne/cm² and a melt flow rate (MFR) which satisfy the relation

FI > 75 x MFR, and

(vi) an amount (W (% by weight)) of a decane-soluble portion at 23°C and a density (d) which satisfy the relation,

in the case of MFR ≤ 10 g/10 min,

$$W < 80 \times \exp(-100(d-0.88)) + 0.1$$

in the case of MFR > 10 g/10 min,

$$W < 80 \times (\text{MFR}-9)^{0.26} \times \exp(-100(d-0.88)) + 0.1;$$

and

[B-1] a high pressure radical polymerization low-density polyethylene having the following properties:

(i) a melt flow rate (MFR) of 0.1 to 50 g/10 min, and

(ii) a molecular weight distribution (Mw/Mn,

Mw = weight-average molecular weight, Mn = number-average molecular weight) measured by GPC and a melt flow rate (MFR) which satisfy the relation

$$\text{Mw/Mn} \geq 7.5 \times \log(\text{MFR}) - 1.2;$$

the weight ratio [A-1]:[B-1] being from 99:1 to 60:40."

The remaining claims relate to a film (Claim 2) formed from a composition according to Claim 1, a process (Claim 3) for producing the a film as defined in Claim 2, use (Claim 4) of the film as defined in

Claim 2 as a wrapping film, a multi-layer film (Claim 5) comprising at least one layer of film according to Claim 2 and a process (Claim 6) for producing a multi-layer film as defined in Claim 5. Dependent Claim 7 referred to a preferred embodiment of the process of Claim 6.

II. A notice of opposition was filed by ExxonMobil Chemical Patents Inc. on 30 May 2001 requesting revocation of the patent in its entirety. The opponent opposed the patent on the grounds that its subject-matter was not patentable within the terms of Articles 54 and 56 EPC (Article 100 (a) EPC) and that the invention was not sufficiently disclosed (Article 100(b) EPC).

In the course of the opposition procedure, the opponent raised an objection against Claim 5 as granted under Article 100(c) EPC.

The following documents were *inter alia* cited during the opposition procedure:

D1: EP-A-0 598 626;

D4: EP-A-0 452 920;

D7: Attachment 1 filed with letter dated 29 December 2004 (relating to the relationship between the melt flow rate and the melt tension (feature (iv) of Claim 1));

D10: Attachment 4 filed with letter dated 29 December 2004 ("Current Status and Future Trends of Polyethylene Usage in the West European Film

Industry", Applied Market Information Ltd.,
January 1991); and

D12: Attachment 6 filed with letter dated 29 December
2004 (a document relating to extrusion machinery
used in the art to extrude linear low density
polyethylene (in blends with low density
polyethylene)).

III. By an interlocutory decision which was announced orally
on 2 March 2005 and issued in writing on 15 March 2005,
the opposition division decided to maintain the patent
in amended form based on the claims of the proprietor's
auxiliary request 3.

(a) The claims of auxiliary request 3 differed from
the claims as granted in that Claim 1 had been
amended as follows (amendments underlined):

- the range of the density of component [A-1] had
been amended to 0.890 to 0.935 g/cm³ (feature (i)),

- the inequality in feature (v) of component [A-1]
had been amended to

$FI > \underline{100} \times MFR;$

- the first inequality in feature (vi) of
component [A-1] (for $MFR \leq 10$ g/10 min) had been
amended to

$W < \underline{40} \times \exp(-100(d-0.88)) + 0.1;$ and

- the disclaimer "other than Comparative Example 5 of EP 0 598 626 A2" had been added at the end of Claim 1.

- (b) The opposition division held that the claims of auxiliary request 3 met the requirements of Article 123(2), that Claim 5 of this request met the requirements of Article 100(c) EPC, and that the objections raised under Article 100(b) EPC were without merit. Furthermore, the claimed subject-matter was novel over the cited prior art, in particular D1, a document citable under Article 54(3) and (4) EPC. The claimed subject-matter also involved an inventive step whereby D4 was considered to represent the closest prior art.

IV. On 12 May 2005, the appellant (opponent) filed a notice of appeal against the above decision with simultaneous payment of the prescribed fee.

With the statement of grounds of appeal the appellant filed on 13 July 2005 the following documents:

- D8': graph for the extractables (W) relationship according to Claim 1 as maintained by the opposition division;
- D13: Technical information on "Escorene - "Linear Polyethylenes for Blown Film", relating to "Linear Polyethylenes versus High Pressure LDPE", "Processability of LLDPE", and "LLDPE Blends", Esso Chemicals, 12/88;

D14: Encyclopedia of Polymer Science and Technology,
Vol. 6, John Wiley & Sons Inc., 1986, 386-422;

D15: Figures 1A, 1B and 2 relating to a Rheotens test;
and

D16: English translation of JP 310617/92 (second
priority document of D1).

Appellant's arguments filed with the statement of
grounds of appeal and with the letter dated 26 May 2006
may be summarized as follows:

- (a) The appellant maintained its objection regarding
sufficiency of disclosure and referred to its
submissions of 29 December 2004 where it was
argued that it was not clear how the melt tension
had to be measured, in particular with respect to
the stretching of the molten polymer at a specific
constant rate. Furthermore, the requirement of
sufficiency of disclosure was not fulfilled over
the entire breadth of Claim 1 because the melt
tension could not be measured when component [A-1]
of Claim 1, which was a linear low density
polyethylene (LLDPE) with a narrow molecular
weight distribution, had an an MFR of less than
around 0.1 g/10 min or in excess of around
10 g/10 min.

- (b) D1 (validly claiming priority from JP 310617/92)
disclosed on page 27, lines 9-55 an ethylene
copolymer composition formed from an ethylene/ α -
olefin copolymer composition [C1] comprising an
ethylene/ α -olefin copolymer [A4] and an

ethylene/ α -olefin copolymer [A5], and a high-pressure radical polymerization low-density polyethylene [B1]. The LDPE [B1] disclosed in D1 was identical to component [B-1] of Claim 1 as maintained by the opposition division and composition [C1] fulfilled each and every requirement of component [A-1] of this claim. The fact that composition [C1] was composed of two copolymers ([A4] and [A5]) was irrelevant to the question of novelty since both composition [C1] of D1 and component [A-1] of Claim 1 as maintained by the opposition division were characterized through exactly the same parameters.

- (c) As regards inventive step, the appellant pointed out that using blends of LLDPE and low density polyethylene (LDPE), in particular LLDPE-rich blends, in order to improve LLDPE's processability in film extrusion processes was a practice adopted by the whole of the European film producing industry in staggering volumes, as demonstrated by D10 and D13. The available equipment for blending could be seen from D12. Blending was so common prior to the applicable priority date of the opposed patent that it was reflected by standard reference literature, such as D14.

D4 was the closest prior art because of its structural similarity (in this context reference was made to D7 and D8') and its focus on shared technical problems of processability/melt tension and related technical effects. The difference between the closest prior art D4 and the ethylene copolymer composition according to Claim 1 was the

presence of the second component [B-1], which was a high-pressure polymerization LDPE. The only technical effect achieved by the claimed subject-matter and actually demonstrated in the examples of the patent in suit was an increase in melt tension upon the addition of the LDPE. Thus, the objective technical problem with respect to the closest prior art had to be seen in the provision of an ethylene copolymer composition for film production wherein the melt tension was increased. In view of the significance of melt tension to the technical problem, the appellant elaborated on the technical meaning and relevance of this parameter which included a reference to a Rheotens test (D15).

The solution to the objective technical problem was obvious from D10, D13 and D14. To the skilled person, the addition of LDPE to the LLDPE of D4 held the foreseeable benefit of increasing the melt tension and thus improving processability: The addition of the LDPE improved the melt tension and processability for the same reason as it did in the state of the art set out in D10 or D14. For the skilled person it was evident that any beneficial effect resulting from the use of the polymer compositions of D4 could be combined with that obtainable by using an LLDPE + LDPE blend. A higher level of long chain branches imported through the LDPE resulted in increased melt tension as well as reduced power consumption.

V. The submissions of the respondent (proprietor) presented in the letter dated 3 April 2006 may be summarized as follows:

- (a) D12 and D13 should not be admitted into the proceedings because the public availability of these documents was questionable.

- (b) The claims of the patent in suit were entitled to priority from JP 68282/93 filed 26 March 2003. However, partial priority could also be claimed from JP 157937/92 (17 June 1992) which contained a disclosure of all the features of Claim 1 with the exception of parameter (ii) of [B-1]. This parameter was concerned with the relationship between the molecular weight distribution (Mw/Mn) and the melt flow rate (MFR) and stated that:

$$Mw/Mn \geq 7.5 \times \log(MFR) - 1.2.$$

Polyethylene with a MFR between 0.1 and 1 g/10 min fulfilled the above parameter. Consequently, the compositions of the claims in suit which used a polyethylene [B-1] between 0.1 and 1 g/10 min were identical to those disclosed in JP 157937/92. Such compositions were therefore validly entitled to claim a priority date of 17 June 1992. This date was before the earliest priority date of D1 and thus Comparative Example 5 of D1, which used a polyethylene with an MFR of 0.50 g/10 min, was not citable against the claims in suit. In that case, the respondent should be allowed to delete the disclaimer in accordance with the exception to the

prohibition of *reformation in peius* as set out in G 1/99 (OJ EPO 2001, 381).

- (c) The appellant had not shown with evidence that those skilled in the art were unable to understand or measure the melt tension and thus there was still no case to answer under sufficiency, as recognised by the opposition division.

- (d) The ethylene/ α -olefin copolymer composition [C1] disclosed on page 27 of D1 was a blend of two copolymers. In contrast, the copolymer [A-1] in the claims in suit was a single component.

- (e) It was pointed out that the types of LLDPE used in industry and described in D10 and D12-D14 differed from those of the patent in suit. They were produced by Ziegler-type titanium catalysts and they did not fulfil requirement (vi) defined in Claim 1. In order to illustrate the difference between the properties of the LLDPEs used in the patent in suit and those prepared using Ziegler-type titanium catalysts a graph was submitted showing MT *versus* MFR (D17).

Thus, if the skilled person was considering the problem of how to adapt LLDPE as defined in the claims in suit in order to improve its properties, he would not find any information from the documents relied upon by the appellant (D10, D12-D14) that would be relevant to solving such problem. In addition, it was pointed out that the claimed composition maintained the excellent

results shown by LLDPE in terms of gloss, film impact and anti-blocking properties.

- VI. In a communication dated 13 April 2007, the board drew the attention of the parties to T 757/03 of 23 June 2006. In this case which related to EP-B-0 781 789, this board (although in a different composition) had found that the method of measuring the melt tension was insufficiently disclosed.
- VII. In the letter dated 4 May 2007, the appellant indicated that it wished to supplement the arguments on Article 83 EPC in respect of the melt tension determination by the facts and arguments on which T 757/03 and T 412/02 of 16 June 2004 were based.
- VIII. On 9 July 2007, the respondent resubmitted a copy of the claims as upheld by the opposition division entitled "Main request". Furthermore, claim sets for auxiliary requests 1, 2 and 3 were filed. However, the latter are not relevant to this decision and therefore will not be discussed in further detail.

In order to demonstrate that the measuring of the melt tension referred to in the in the patent in suit was sufficiently disclosed, and in particular that a MT measuring apparatus from Toyo Seiki Seisakusho K.K. as mentioned in the patent in suit was well known to the skilled person, the following documents were filed:

D18: Figure A (Schematic diagram of a MT test equipment);

- D19: Figure B (a curve MT versus take-up rate of a typical general purpose polyethylene);
- D20: Experimental Report 1 (MT values for three different PE polymers at different take-up rates);
- D21: Experimental Report 2 (MT values of fibres having low and high MFR);
- D22: copy of the front page and page 8 of WO A 93/08221;
and
- D23: John Dealy, "Rheometers for Molten Plastics", Van Nostrand Reinhold Co., 1982, 250-251.

In order to demonstrate that the two companies Toyoseiki (referred to in D22 and D23) and Toyo Seiki Seisakusho K.K. (referred to in the patent in suit) were the same, the respondent filed with the letter dated 19 July 2007 the following document:

- D24: Copy of a document from the website
http://www.toyoseiki.co.jp/toyo_e/about.html

IX. With a letter dated 9 August 2007, the appellant filed a copy of EP-A-0 781 789 (the A2 document of the patent EP-B-0 781 789 that was revoked in T 757/03) and a copy of the Wagner et al. reference, which had been discussed in T 757/03:

- D25: M.H. Wagner et al, "The rheology of the rheotens test", Journal of Rheology, volume 42 (1998), 917-922.

- X. On 9 August 2007, oral proceedings were held before the board where both parties basically relied upon their written submissions.

In the discussion of inventive step, the appellant did not rely on D12 any more and stated that he did not want to introduce D13 into the proceedings.

As regards inventive step, the respondent emphasized the difference between a "conventional" LLDPE and a "new" LLDPE which was required as component [A-1] in the patent in suit. Furthermore, it was pointed out that the claimed compositions maintained the excellent impact properties of LLDPE despite the addition of LDPE. This had to be seen as part of the technical problem to be achieved by the claimed compositions.

- XI. 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 in amended form as allowed by the opposition division on the basis of Claims 1-7 refiled with the letter dated 9 July 2007 (main request), or, in the alternative,

that the decision under appeal be set aside and the patent be maintained on the basis of one of the auxiliary claim sets, all filed with the letter dated 9 July 2007, namely

- 1st auxiliary request (Claims 1-7),

- 2nd auxiliary request (Claims 1-7), or
- 3rd auxiliary request (Claims 1-7).

Reasons for the Decision

1. The appeal complies with Articles 106 and 108 EPC and Rule 64 EPC and is therefore admissible.
2. *Priority*
 - 2.1 D1, a published European application validly designates all states designated in the patent in suit, and validly claims a priority date of 19 November 1992 from JP 310617/92 (D16). It was published on 25 May 1994. In the decision under appeal D1 was considered to be state of the art pursuant to Article 54(3) and (4) EPC because, according to the opposition division, the claims in suit were not entitled to a priority date of 17 June 1992 from JP 157937/92 but only to a priority date of 26 March 1993 from JP 68282/93. Consequently, a disclaimer was added to Claim 1 to remove Comparative Example 5 of D1 from the scope of the claims (point III(a), above).
 - 2.2 It has never been questioned that the claims of the patent in suit are entitled to a priority date of 26 March 2003 from JP 68282/93. However the respondent argued that partial priority could also be claimed from JP 157937/92 (17 June 1992) which contained a disclosure of all the features of Claim 1 with the exception of parameter (ii) of [B-1]. This parameter was concerned with the relationship between the

molecular weight distribution (M_w/M_n) and the melt flow rate (MFR) and stated that:

$$M_w/M_n \geq 7.5 \times \log(\text{MFR}) - 1.2.$$

Since, however, M_w/M_n of any (co)polymer always was equal to or greater than 1, this parameter (ii) was not a distinguishing feature for a polyethylene [B-1] with an MFR of below 1.97 g/10 min (only an MFR ≥ 1.97 g/10 min gave a value ≥ 1 on the right hand side of the above cited relationship). Thus, compositions of the claims in suit which used a polyethylene [B-1] with an MFR below 1.97 g/10 min were identical to those disclosed in JP 157937/92 and therefore entitled to claim a priority date of 17 June 1992. This date was before the valid priority date of D1 and thus Comparative Example 5 of D1, which used a polyethylene with an MFR of 0.50 g/10 min, was not citable against the claims in suit. In that case, the respondent should be allowed to delete the disclaimer in accordance with the exception to the prohibition of *reformation in peius* as set out in G 1/99 (*supra*).

- 2.3 However, the board cannot decide differently on the priority issue from the opposition division for the following reasons:

The parameter (ii) for [B-1] reflects the recognition that the molecular weight distribution depends upon the MFR. It is conspicuous to the board that such a recognition is completely absent from JP 157937/92 which in itself is an indication that JP 157937/92 is not directed to the same invention as the claims in suit. Furthermore, even if one accepts that

parameter (ii) in the claims in suit defines two distinct alternatives for the polyethylene [B-1], namely the first alternative with an MFR ≥ 1.97 g/10 min and the second with an MFR < 1.97 g/10 min (where no restrictions with respect to the molecular weight distribution exist), it is conspicuous to the board that JP 157937/92 does not disclose that second alternative. In fact, JP 157937/92 does not disclose an MFR of 1.97 g/10 min or a range below that value, let alone the relevance of such a range in relation to the molecular weight distribution. Therefore, the requirement for claiming priority as set out in G 2/98 (OJ EPO 2001, 413, headnote), namely *"that priority of a previous application in respect of a claim in a European patent application in accordance with Article 88 EPC is to be acknowledged only if the skilled person can derive the subject-matter of the claim directly and unambiguously, using common general knowledge, from the previous application as a whole"*, is not met for the "second" alternative identified by the respondent. Consequently, partial priority cannot be claimed from JP 157937/92 and Comparative Example 5 is citable against the claims in suit under Article 54(3) and (4) EPC.

2.4 In view of the board's finding on the priority issue, the respondent did not pursue its request to delete the disclaimer from Claim 1.

3. *Article 100(c) EPC / amendments*

3.1 Claims 1-7 of the main request are identical with the claims as allowed by the opposition division (point III(a), above).

3.2 The opposition division's finding that Claim 5 of the main request meets the requirements of Articles 100(c) and 123(2) EPC, respectively, as well as the finding that the amendments to Claim 1 of the main request meet the requirements of Articles 123(2) and (3) and 84 EPC was not challenged by the appellant. Nor does the board see any reason to raise an objection of its own.

3.3 As regards the disclaimer in Claim 1, it is apparent from the priority discussion in point 2, above, that the disclaimer has been introduced to restore novelty by delimiting the claim against state of the art under Article 54(3) and (4) EPC. This is, according to G 1/03 (OJ EPO, 2004, 413, headnote II.1), allowable.

3.4 Thus, no formal objections arise against Claims 1-7 of the main request.

4. *Sufficiency of disclosure (main request)*

4.1 In Claim 1 of the main request the melt tension (MT) of the ethylene/C₃₋₂₀ α -olefin copolymer [A-1] is set in a relationship with the melt flow rate (MFR) of [A-1] such that $MT > 2.2 \times MFR^{-0.84}$. With respect to the parameter MT, the appellant raised two objections, namely, (i) that it was in principle not possible to measure MT for a copolymer [A-1] having a MFR of less than around 0.1 or in excess of around 10 g/10 min and (ii) that it was not clear how MT had to be measured.

4.2 As regards objection (i), it is conspicuous to the board that the appellant has not provided any evidence in support of this objection whereas the respondent has

submitted an Experimental Report 2 (D21) where the MT value was determined for a copolymer [A-1] having an MFR of 26.7 g/10 min. Furthermore, the application as originally filed discloses in Table 10 three copolymers with an MFR of 123, 165 and 19.2 g/10 min, respectively, whereby for all these copolymers a MT value of > 0.1 g is indicated. Although no exact values are given, it is nevertheless evident from Table 10 that the MT values were measured. Finally, D4 discloses in Example 5 a copolymer which has an MFR of 0.075 g/10 min and an MT of 42 g. All these data show that the MT value can be determined for samples with an MFR of less than 0.1 or in excess of 10 g/10 min. Hence, the appellant's allegation that the invention cannot be worked over the whole range claimed is without merit.

- 4.3 With respect to the measurement of MT, it is apparent from Claim 1 that the parameter is measured at 190°C. The measurement is explained in further detail at page 4, line 54 to page 5, line 1 of the patent in suit (corresponding passage on page 25, lines 17-27 of the application as originally filed):

"In the invention, the melt tension (MT (g)) of an ethylene/ α -olefin copolymer is determined by measuring a stress given when a molten copolymer was stretched at a constant rate. That is, a powdery polymer was melted in a conventional manner, and the molten polymer was pelletized to give a measuring sample. Then, the MT of the sample was measured under the conditions of a resin temperature of 190°C, an extrusion rate of 15 mm/min and a take-up rate of 10 to 20 m/min using a MT measuring apparatus (produced by Toyo Seiki Seisakusho

K.K.) having a nozzle diameter of 2.09 mmø and a nozzle length of 8 mm."

- 4.3.1 As can be seen from the above cited passage in the patent in suit, a key element for measuring MT of the copolymer [A-1] is the apparatus produced by Toyo Seiki Seisakusho K.K. In order to demonstrate that such a machine and its working was well known to the skilled person, the respondent provided D22 and D23.

D22, an international application filed in the name of the Dow Chemical Company, is contemporaneous with the patent in suit and is concerned with elastic substantially linear olefin polymers. At page 8, lines 22-25 of D22 the measurement is said to be:

"... similar to the "Melt Tension Tester" made by Toyoseiki and is described by John Dealy in "Rheometers for Molten Plastics", published by Van Nostrand Reinhold Co. (1982) on page 250-251)."

The text book referenced in D22 was filed as D23. D23 mentions in the passage bridging pages 250 and 251 the Melt Tension Tester made by Toyoseiki which is said to be similar to the Rheotens. Thus, both D22 and D23 refer to a machine manufactured by Toyoseiki which is, as can be seen from D24, the same company as Toyo Seiki Seisakusho K.K. mentioned in the patent in suit.

The fact that such a machine appeared in a text book published over ten years before the filing date of the patent in suit (as evidenced by D23) and was known to other polymer manufacturers (as evidenced by D22) demonstrates that the machine was indeed widely known

in the art and its working would be well understood by the skilled person. Thus, following the detailed information in the patent in suit and applying the common general knowledge relating to the Melt Tension Tester produced by Toyoseiki a skilled person is, in the board's view, in a position to carry out a reliable measurement of the melt tension.

- 4.3.2 The appellant, on the other hand, has not provided any evidence which could cast doubt on the finding that the Melt Tension Tester made by Toyoseiki was not common general knowledge for the skilled person.

As regards the appellant's argument that there were at least two machines available from Toyoseiki is not supported by the facts on file. Both D22 and D23 refer to "the Melt Tension Tester" which does not imply the existence of two or more Melt Tension Testers made by Toyoseiki. The only other machine mentioned on page 251 of D23 is a "Melt Strength Device". In the board's view, a person skilled in the art trying to measure the **melt tension** of a copolymer would normally go for the **Melt Tension Tester** referred to in D23 and not the Melt Strength Device.

- 4.3.3 Nor was the appellant in a position to demonstrate that other insuperable difficulties existed in determining the MT parameter.

The appellant's argument that the method of measurement for MT was insufficiently disclosed because the length of the spin line to be used in the Melt Tension Tester was not indicated, is not convincing for the following reasons: The length of the spin line is apparently of

importance in the Rheotens made by Göttfert. However, it is conspicuous to the board that the MT measurement with the Toyoseiki machine is apparently not identical with a Rheotens test. They might be similar, as stated in D23, but this does not mean that they are identical. In particular, the board has no reason for reading into the word "similar" the concept that they work according to the same principle. On the contrary, D23 does not elaborate on the nature of the similarity. Therefore, issues relating to Rheotens cannot be held against the Melt Tension Tester made by Toyoseiki. Nor has the appellant provided any evidence which would support the alleged lack of sufficiency arising from the missing indication of the spin line length.

The appellant also argued that the relevant passage in the patent in suit indicated an extrusion rate of 15 mm/min and a take-up rate of 10 to 20 m/min but did not indicate at which specific "constant rate" the melt tension should be measured. However, the indication of a range of 10 to 20 m/min for the take-up rate does not give rise to an objection under sufficiency of disclosure for the following reasons: In general, an apparatus for extruding and collecting fibres allows for variation in the rate at which the fibre is collected after extrusion. This rate is referred to as the "take-up rate". When the take-up rate is relatively low, the melt tension of a polymer such as polyethylene is also relatively low. As the take-up is increased, MT is also seen to increase. As can be seen from the plot D19 provided by the respondent (MT *versus* take-up rate for a typical general purpose polyethylene), further increases in take-up rate lead to a plateau effect and MT becomes essentially constant (the limiting value),

despite further increases in take-up rate, over a wide range of take-up rates. The limiting value of MT can be measured at any part of the plateau or constant region of MT *versus* take-up rate curve which is, according to the respondent, typically in the range of 10 to 20 m/min. As pointed out by the respondent, the skilled person knows very well that this behaviour is generally exhibited by polyolefins and therefore would understand that the reference in the patent in suit to a take-up rate of 10 to 20 m/min simply means that the limiting value of MT should be measured at any convenient take-up rate within the range between 10 and 20 m/min. In order further to support this argument, the respondent has filed Experimental Report 1 (D20) which shows experiments with three different polymers, namely a general purpose polyethylene, a 4-methyl 1-pentene copolymer and a 1-butene copolymer. As can be seen from these experiments, all three polymers show the same plateau in the curves of MT *versus* take-up rate and for each the limiting value of MT is reached before a take-up rate of 10 m/min and sustained well beyond the take-up rate of 20 m/min. In other words, the experiments show that the value for MT within a take-up range of 10 to 24.7 m/min is virtually independent of the actual take-up rate. Hence, the indication of a range of 10 to 20 m/min for the take-up rate in relation to the MT measurement of the copolymer [A-1] causes no difficulties to a person skilled in the art.

4.3.4 In view of the above, the board comes to the conclusion that the method of measurement for MT is sufficiently disclosed in the patent in suit.

4.3.5 This finding is not at variance with the two previous decisions from this board, namely T 757/03 of 23 June 2006 and T 412/02 of 16 June 2004 (neither of them published in the OJ EPO) because the facts underlying the two previous decisions differ from those of the present case.

In T 757/03, the method of measurement for MT was described in exactly the same manner as in the present case (see point 4.3, above), including a reference to a machine made by Toyo Seiki Seisakusho K.K. The patent proprietor had not established in T 757/03 that the machine made by Toyo Seiki Seisakusho K.K. was widely known in the art and its working would be well understood by the skilled person. Hence, the board decided in T 757/03 that the parameter MT amounted to a newly reformulated and unfamiliar parameter which was insufficiently disclosed (point 5.2.2 and 5.3.3 of the reasons). In the present case, however, the same corporate patent proprietor as in T 757/03 has filed D22 and D23 which clearly demonstrate that the machine made by Toyo Seiki Seisakusho K.K. was common general knowledge. Thus, different facts, namely D22 and D23, result in a different finding on the sufficiency of the measurement of MT.

In T 412/02, Claim 1 had been amended during the opposition appeal proceedings by introducing a relationship between MT and MFR (basically $\log[MT] \geq -0.8 \log[MFR] + 0.3$). This board, again in a different composition, refused the amendment to Claim 1 under Article 84 EPC - *inter alia* - because it was not clear which temperature should be applied for the determination of the MT. The application in that case

as originally filed referred only to "a melting temperature" but did not indicate the exact test temperature. Apart from the fact that MT is part of the granted claim in the present case and thus not objectionable under Article 84 EPC, the measuring temperature for MT is not an issue in the present case. The relevant passage in the patent in suit (point 4.3, above) clearly identifies this temperature as being 190°C.

5. *Novelty (main request)*

5.1 The only relevant document with respect to novelty is D1 which is, as shown in point 2, above, state of the art pursuant to Article 54(3) and (4) EPC.

5.2 D1 discloses various ethylene copolymer compositions comprising one or more ethylene/ α -olefin copolymers and a low-density polyethylene obtained by high pressure polymerization, a crystalline polyolefin, an olefin type elastomer or a graft modified ethylene elastomer. Comparative Example 5 of D1 discloses in Table 14 a composition comprising the two ethylene/hexene copolymers [A10] and [A11] and the high pressure radical polymerization low-density polyethylene [B10]. The appellant has shown during the opposition procedure that copolymer [A10] and polyethylene [B10] of Comparative Example 5 of D1 meet all the requirements of copolymer [A-1] and polyethylene [B-1] of Claim 1 as granted. However, Claim 1 of the main request contains a disclaimer which removes Comparative Example 5 of D1 from the scope of the claims in suit. Thus, Comparative Example 5 of D1 is not novelty destroying for the claims in suit.

5.3 It has not been shown that any other composition of the examples of D1 would fall within the scope of the claims in suit, but the appellant has raised a novelty objection against Claim 1 of the main request in view of the passage on page 27, lines 9-55 of D1. This passage relates to "the eighth copolymer composition according to the present invention" which is formed from an ethylene/ α -olefin copolymer composition [C1] comprising the ethylene/ α -olefin copolymer [A4] and an ethylene/ α -olefin copolymer [A5] (with the proviso that the ethylene/ α -olefin copolymer [A4] differs from the ethylene/ α -olefin copolymer [A5]), and the high-pressure radical polymerization low-density polyethylene [B1]. According to the appellant, component [B1] as disclosed in D1 is identical with component [B-1] of Claim 1 of the main request, at least in the case of a MFR of 0.1 g/10 min, and composition [C1] is identical with component [A-1] of Claim 1 of the main request.

5.3.1 The respondent was of the opinion that the claimed subject-matter was different from D1 because component [C1] of D1 was a blend of ethylene/ α -olefin copolymer [A4] and ethylene/ α -olefin copolymer [A5] whereas the copolymer [A-1] in the claims in suit was a single component. However, as pointed out by the appellant, a copolymer is a composition in itself, eg "a copolymer" is composed of polymer molecules of different chain length. Furthermore, it is stated in paragraph [0093] of the patent in suit that the polymerization of [A-1] "*may also be carried out in not less than 2 steps having reaction conditions different from each other*". In other words, component [A-1] of

the patent in suit may be a reactor blend. A similar statement can be found in D1 on page 27, lines 47-49 where it is said that "*the ethylene/ α -olefin copolymer composition [C1] may be prepared by forming the ethylene/ α -olefin copolymer [A4] and the ethylene/ α -olefin copolymer [A5] in two or more copolymerization stages having reaction conditions different from each other, or ...*". Thus, it appears that the difference between the blend [C1] and the copolymer [A-1] is merely a difference in words but not a difference in substance. If the blend [C1] of D1 has the same parameters as [A-1] of the claims in suit, such a composition composed of two copolymers appears to be indistinguishable from a composition composed of "only one" copolymer.

- 5.3.2 But even if one accepts that the term "an ethylene/C₃₋₂₀ α -olefin copolymer" as used in the patent in suit encompasses blends as disclosed in D1, a detailed analysis of the relevant passage on page 27 shows that this disclosure is not novelty destroying to the claimed subject-matter.

Page 27, lines 19-44 indicates that [C1] preferably has the following properties (c-i) to (c-vi):

- (c-i) a density (d) in the range of 0.850 to 0.980 g/cm³, preferably 0.890 to 0.955 g/cm³, more preferably 0.900 to 0.950 g/cm³;
- (c-ii) a MFR in the range of 0.1 to 100 g/10 min, preferably 0.2 to 50 g/10 min;
- (c-iii) a MT which satisfies the relation:

$$MT \geq 2.2 \times MFR^{-0.84};$$

(c-iv) a FI which satisfies the relation:

$$FI > 100 \times MFR;$$

(c-v) a Tm which satisfies the relation:

$$Tm < 400 \times d - 250; \text{ and}$$

(c-vi) a quantity fraction W of a decane-soluble portion which satisfies the relation:

in the case of $MFR \leq 10$ g/10 min:

$$W < 80 \times \exp(-100(d-0.88)) + 0.1,$$

preferably $W < 60 \times \exp(-100(d-0.88)) + 0.1$, more preferably $W < 40 \times \exp(-100(d-0.88)) + 0.1$, and

in the case of $MFR > 10$ g/10 min:

$$W < 80 \times (MFR-9)^{0.26} \times \exp(-100(d-0.88)) + 0.1.$$

The high-pressure radical polymerization low-density polyethylene [B1] has a MFR of 0.01 to 100 g/10 min, preferably 0.05 to 10 g/10 min, more preferably 0.1 to 8 g/10 min as can be seen from the passage bridging pages 18 and 19.

In order to arrive at something falling within the scope of Claim 1 of the main request one would have to select for [C1] a density falling within the range required in Claim 1 (0.890 to 0.935 g/cm³) and the preferred range for W. Furthermore, one would have to select a low MFR for [B1], eg 0.1 g/10 min, so that

requirement [B-1](ii) of present Claim 1 is met. According to decision T 653/93 of 21 October 1996 (not published in the OJ EPO, point 3.2 of the reasons), in case of "multiple selection", the question of novelty cannot be answered by contemplating the ranges of various parameters separately. Moreover, one would have to show that the "combined selection" emerges from the prior art.

In the present case, a person skilled in the art had no reason, when applying the teaching of page 27 of D1, to concentrate on the combination of the above mentioned features. Such a combined selection is neither explicitly disclosed in nor derivable from D1. Such a combined selection is also not derivable from Examples 12 and 13 of D1 referred to by the appellant. Although these examples disclose blends of two ethylene/ α -olefin copolymers in admixture with a high-pressure radical polymerization low-density polyethylene [B10] having a MFR of 0.5 g/10 min, it is not clear whether these examples relate to component [C1] mentioned on page 27 because T_m , which relates to requirement (c-v) of page 27, is not even indicated for the blends of these examples. Hence, these examples cannot be used to support a selection of parameters which lead to a novelty destroying disclosure.

- 5.3.3 In summary, the passage on page 27 of D1 does not disclose the combination of parameters required in Claim 1 of the main request.

5.4 Consequently, the subject-matter of Claim 1 of the main request, and, by the same token, the subject-matter of Claims 2-7 of the main request is novel over D1.

6. *Problem and solution*

6.1 The patent in suit is directed in general terms to ethylene copolymer compositions comprising a linear low density polyethylene (LLDPE), ie component [A-1], and a high-pressure low density polyethylene (HD-LDPE), ie component [B-1]. The compositions are excellent in heat stability, melt tension and flowability under the high-shear region, and films obtained from these compositions are excellent in transparency, mechanical strength and blocking resistance (paragraph [0010] of the patent specification). The LLDPE used in the patent in suit is an ethylene/C₃₋₂₀ α -olefin copolymer which has certain defined properties, namely properties [A-1](i)-(vi). These properties are typical of a LLDPE produced using a metallocene-type catalyst. In contrast, "conventional" LLDPE is produced using a Ziegler-type titanium catalyst. The "conventional" LLDPE differs from the one used in the patent in suit insofar as they do not fulfil requirement (vi) defined in present Claim 1.

6.2 D4 discloses ethylene copolymers which are likewise metallocene-produced LLDPEs. The general disclosure of D4 does not disclose each and every feature of component [A-1] of present Claim 1, but Example 12 of D4 discloses in Table 2 an LLDPE made from ethylene and hexene which has exactly the same density, MFR, MT, DSC maximum melting peak and percentage of decane soluble component as polymer A-1-5 in the patent in suit.

Although a value of the flow index (FI) is not given in Example 12 of D4, due to the similarity of this example to polymer A-1-5 of the patent in suit it must be assumed that Example 12 has a similar FI as polymer A-1-5. Consequently, the copolymer of Example 12 of D4 must meet all the requirements of component [A-1] of Claim 1 of the main request.

Apart from this structural similarity, D4 discloses technical effects and intended use most similar to the subject-matter claimed in the main request. Thus, D4 refers to the necessity of selecting an ethylene copolymer having a high MT compared with its molecular weight when an inflation film is molded (page 2, lines 20-22) or stickiness of films (equivalent to "blocking" as described in the patent in suit). However, D4 does not disclose the addition of LDPE.

Thus, D4, and in particular a copolymer as described in Example 12 of D4, is considered to represent the closest prior art.

- 6.3 The above analysis shows that the difference between the compositions of the claims in suit and the prior art lies in the presence of the second component [B-1] which is a LDPE.

As can be seen from Table 3 in the patent in suit, compositions comprising components [A-1] and [B-1] (Examples 1-3, 5 and 6) exhibit a higher MT than the corresponding component [A-1] alone. A higher MT normally manifests itself in an improved mouldability (Table 3, last column). Furthermore, it is apparent from Table 3 that the compositions comprising [A-1] and

[B-1] maintain to a high degree the excellent mechanical properties (such as "film impact" and "impact retention") shown by the LLDPE [A-1]. This latter aspect is quite important to the performance of the claimed subject-matter. In contrast, a "conventional" Ziegler-titanium LLDPE does not show such an effect when blended with LDPE. As can be seen from Comparative Example 1 in the patent in suit, a blend comprising "conventional" LLDPE and LDPE has much worse mechanical properties than the LLDPE alone.

Thus, contrary to the opinion of the appellant, the objective technical problem with respect to the closest prior art does not lie solely in the provision of compositions having further improved melt tension (or mouldability). Rather, the objective technical problem has to be seen in the provision of compositions having further improved melt tension (or mouldability) while maintaining the excellent mechanical properties of the prior art polymers.

In view of the examples provided in the patent in suit, the results of which are summarized in Table 3, the board is satisfied that the above defined objective technical problem is solved by the features required in Claim 1 of the main request.

7. *Inventive step*

7.1 It remains to be decided whether the proposed solution, ie the addition of a LDPE, is obvious from the available prior art in order to solve the objective technical problem. The relevant documents for the assessment of inventive step are D4, D10 and D14.

7.2 D4 is the only citable prior art which is concerned with metallocene-produced LLDPE (see point 6.2, above). This document itself does not suggest to add a LDPE as a further component, let alone to add LDPE in order further to improve the mouldability of the LLDPE while maintaining its good mechanical properties.

7.3 The appellant basically relied on a combination of the closest prior art with D10 and D14. D10 describes the practice of film manufacturers to blend LDPE with LLDPE. D14 is an extract from an encyclopaedia relating to LDPE. Under the section "Products and Uses" on page 420, D14 discusses blends of LDPE with LLDPE as being especially useful for film applications. Furthermore, on page 422, section "Blends and Coextruded Film", D14 discloses that in film applications LLDPE is blended with 25-50%, and sometimes with 75%, of LDPE homopolymers in order to increase the rate of extrusion and the melt strength of the polymer during the film blowing operation and provide better properties.

7.4 However, this line of argumentation is not convincing for the following reasons:

Firstly, D10 and D14 deal with "conventional" LLDPE used by industry at that time which were produced using Ziegler-type titanium catalysts. Thus, although these documents may be contemporaneous with the date of the patent in suit, they do in fact not contain any information which is of relevance to the "new" type of LLDPE used as component [A-1] in present Claim 1. It takes several years for a newly developed material to progress through the experimental and testing stages to

eventually become a common industry practice which might be presented in documents such as D10 and D14. It is hard to see why the skilled person would consider such documents when he is faced with a problem relating to "new" LLDPE, namely further improving the mouldability of this "new" LLDPE without sacrificing its mechanical properties. Normally, it is not permissible to assume that the "new" LLDPE would behave in the same way as the "conventional" LLDPE. Product performance and properties of a blend comprising the "new" LLDPE can only be determined by testing the specific blend.

Secondly, D10 and D14 do not address a key element of the objective problem, namely maintaining the excellent mechanical properties of the LLDPE. D10 and D14 cannot provide any hint in this direction because it is a fact that the addition of LDPE to a "conventional" LLDPE considerably decreases the mechanical properties as can be seen from Comparative Example 1 in the patent in suit (see also point 6.3, above). Thus, neither D10 nor D14 can provide a hint to the objective technical problem with regard to maintenance of the mechanical properties. Moreover, it appears that a combination of D4 with D10 and/or D14 is based on hindsight. Without the knowledge of the patent in suit a person skilled in the art would not consider such a combination.

- 7.5 The respondent requested that D12 and D13 not be admitted into the proceedings because it was not clear that these documents were made available to the public before the priority date of the patent in suit.

As regards D12, which was briefly referred to in the statement of grounds of appeal, the appellant did not rely on this document any more in the oral proceedings before the board. In fact, this document became virtually superfluous in view of the filing of D14 at the appeal stage. Thus, there was no need to pursue this issue.

As regards D13, the appellant declared in the oral proceedings that he did not want to introduce this document any more and, consequently, did not rely on it any more. Hence, there was no need to pursue this issue.

- 7.6 Summing up, neither D4 alone nor the combination with D10 or D14 would lead the skilled person to add LDPE to the "new" LLDPE in order to improve its melt tension (or mouldability) while maintaining its excellent mechanical properties.

Consequently, the subject-matter of Claim 1 of the main request, and, by the same token, the subject-matter of Claims 2-7, is based on an inventive step (Article 56 EPC).

8. Since the respondent's main request is allowable, any discussion of the auxiliary requests is superfluous.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Kiehl

R. Young