

Internal distribution code:

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

DECISION
of 31 March 2004

Case Number: T 0253/02 - 3.3.3

Application Number: 93119442.7

Publication Number: 0600482

IPC: C08L 23/04

Language of the proceedings: EN

Title of invention:
Resin composition for laminates

Patentee:
MITSUBISHI CHEMICAL CORPORATION

Opponent:
The Dow Chemical Company

Headword:

-

Relevant legal provisions:
EPC Art. 54, 56, 87(1)

Keyword:
"Priority - same invention (no)"
"Document available to the public (yes - on balance of probabilities)"
"New problem formulation (no - not in line with experimental evidence in the patent)"
"Inventive step (no - obvious substitution)"

Decisions cited:
G 0002/98, T 0743/89, T 1188/00

Catchword:

-



Case Number: T 0253/02 - 3.3.3

DECISION
of the Technical Board of Appeal 3.3.3
of 31 March 2004

Appellant: MITSUBISHI CHEMICAL CORPORATION
(Proprietor of the patent) 5-2, Marunouchi 2-chome
Chiyoda-ku
Tokyo (JP)

Representative: Hansen, Bernd, Dr. Dipl.-Chem.
Hoffman Eitle,
Patent- und Rechtsanwälte
Arabellastrasse 4
D-81925 München (DE)

Respondent: The Dow Chemical Company
(Opponent) 2030 Dow Center
Midland
Michigan 48674 (US)

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

Decision under appeal: Decision of the Opposition Division of the
European Patent Office announced orally on
30 January 2002 and posted 8 February 2002
revoking European patent No. 0600482 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: R. Young
Members: P. Kitzmantel
E. Dufrasne

Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 600 482 in respect of European patent application No. 93 119 442.7 in the name of MITSUBISHI CHEMICAL CORPORATION (formerly MITSUBISHI PETROCHEMICAL CO., LTD.), which had been filed on 2 December 1993 claiming two JP priorities of 3 December 1992 and 25 December 1992, was announced on 8 April 1998 on the basis of 22 claims, Claim 1 reading as follows:

"Use of a resin composition containing 50 to 99 % by weight of component A and 1 to 50 % by weight of component B, said component A comprising a copolymer of ethylene and α -olefin having a carbon number of 3 to 18, said component A having the following properties (a) to (c):

- (a) a melt flow rate (MFR) of 2 to 30 g/10 min.;
- (b) a density of not more than 0.935 g/cm³; and
- (c) a single peak of elution volume indicated by an elution curve obtained by temperature rising elution fractionation (TREF), said peak corresponding to a temperature within a range of from 20 to 85°C, and said elution curve satisfying a relationship in which the ratio H/W is not less than 1 when H represents the height of said peak and W represents the width of said elution curve at half of said height H, wherein said elution curve may also indicate substantial elution volume at temperatures other than the temperature to which said peak corresponds,

said component B comprising a high-pressure low-density polyethylene, said component B having the following properties (a') to (d'):

- (a') a melt flow rate of 0.1 to 20 g/10 min.;
- (b') a density of 0.915 to 0.93 g/cm³;
- (c') a memory effect (ME) of not less than 1.6; and
- (d') a melt tension (MT) of not less than 1.5 g

for laminates."

Claims 2 to 20 were dependent on Claim 1 and the same applied *de facto* to Claims 21 and 22 which fail explicitly to mention their appendancy.

- II. Notice of Opposition requesting revocation of the patent in its entirety on the grounds of Art. 100 (a) EPC was filed by The Dow Chemical Company on 8 January 1999.

The opposition was *inter alia* based on documents

D1: US-A-4 339 507,

D2: EXXON Chemical product information: EXACT FACTS™
Vol.1, No. 1, February 1992,

D4: C.S. Speed et al., "Structure/Property Relationships in EXXPOL™ Polymers", Society of Plastics Engineers, Polyolefins VII International Conference, 24 to 27 February 1991, Houston, pages 45 to 50,

D4a: page 55 of document D4, submitted at the opposition oral proceedings on 30 January 2002,

D9: K. Tominari (Mitsui Petrochemicals), "Special Applications and Markets for Ethylene Alpha-Olefin Copolymers in Japan", Specialty Plastics Conference '86, 13 to 15 November 1986, Zuerich, and the later filed, but admitted documents

D12: JP-A-58 194 935 (here considered as "revised" English translation D12A filed with the Opponent's letter dated 29 November 2001),

D15: "Experiment Certificate" from Sumitomo Chemical Co., Ltd. dated 12 May 2000 (English translation of Japanese original),

D17: EXXON Chemical product information: EXACT™, Polymers for Film Packaging Applications, undated, and

D18: EXXON Chemical product information: EXACT™ 4011, Plastomer for Film Blends, dated October 1992.

III. By its decision announced orally on 30 January 2002 and issued in writing on 8 February 2002, the Opposition Division revoked the patent.

It was held in that decision that the claimed subject-matter lacked an inventive step over D12A in combination with D17.

The latter document was considered to be prior art according to Article 54(2) EPC because, in view of the analogously structured coded information contained in

D2 ("119-0192-9000-M"), D17 ("119-1092-0019-A") and D18 ("119-1092-0032-A"), and considering that D2 and D18 comprised the supplementary information "Volume 1, no.1, Feb. 1992" (D2) and "Dated October 1992" (D18), it could not only be concluded that the section "-1092-" in D17's code related to a printing date October 1992 but also that D17 was timely published; the latter conclusion relying on the afore-mentioned supplementary information in D2 which confirmed that "the time gap between printing and publication of these kinds of customer information sheets would be at most 1 month".

It was obvious, in the Opposition Division's view, to replace the Ziegler-Natta catalysed LLDPE (linear low density polyethylene) component used in the extrusion lamination blends of Working Example 1 of D12A in admixture with LDPE (high pressure low density polyethylene) by a metallocene catalysed EXACT LLDPE component according to D17 because the skilled person would expect from this substitution an improvement of the heat sealing and hot tack properties of the so prepared laminates. The compositions resulting from this replacement met all features of Claim 1 of the opposed patent, including feature (c) because "a single elution peak in the temperature range of 20 - 85°C characterizes a metallocene-made LLDPE." In arriving at this conclusion the Opposition Division disregarded experimental data in the patent specification concerning the composition's take-off speed at break because this property "varies widely (also in the comparative examples) without correlation to any other property which may be varied in the composition".

IV. On 5 March 2002 the Patentee (Appellant) lodged an appeal against the decision of the Opposition Division and paid the appeal fee on the same day. The Statement of Grounds of Appeal was filed on 18 June 2002.

Concomitantly, the Appellant replaced the granted claims by an amended set of 19 claims, Claim 1 of this set differing from its granted version by restriction

- of the number of carbon atoms of the α -olefin units of component A to "6 to 10",
- of the range of the memory effect (ME) of component B to "not less than 2.3", and
- of the range of the melt tension (MT) of component B to "not less than 5g".

Granted Claims 13 to 15 have been cancelled, the subsequent claims have been renumbered, and Claims 18 and 19 (formerly 21 and 22) have been amended in accordance with operative Claim 1.

V. The arguments of the Appellant presented in the Grounds of Appeal and at the oral proceedings held on 31 March 2004 may be summarized as follows:

- (a) The new claims complied with the requirements of Article 123(2) EPC because the amended features as well as their combinations were duly supported by general statements in the original disclosure which established their independent character.

- (b) At the oral proceedings the Appellant did not comment on the Board's provisional opinion as expressed in paragraph 1 of the Annex to the summons dated 21 November 2003, namely that, having regard to the operative set of claims, the patent in suit was not entitled to either of the two claimed JP priorities of 3 and 25 December 1992.
- (c) In the Appellant's view, Document D17 should not be considered as prior art according to Article 54(2) EPC because there was no written confirmation of EXXON, D17's author, that the middle section "-1092-" of the code "119-1092-0019-A" related to the document's printing date. Inference of a printing date by analogy to similar information in D2 and D18, doubtful as it was, could not detract from the fact that the Respondent Opponent had not discharged its burden of proof to objectively establish that date. In view of the Respondent's failure in that respect there was no need to go into the question of if and when D17 became available to the public, e.g. in the light of T 743/89 (dated 27 January 1992 not published in the OJ EPO) which was not concerned with the issue of establishing a printing date.
- (d) The Appellant also denied the relevance of document

D20: Kaltenbacher et al., "Prediction of PE Extrusion Coating Properties", SPE

Journal, November 1967, pages 55 to 62

cited for the first time by the Respondent in its appeal submission dated 7 January 2003 and requested that it should not be admitted into these proceedings.

- (e) The LLDPE/LDPE blends of Working Example 1 of D12A, which represented the closest state of the art, diverged from the compositions employed according to present Claim 1 by the different polymer structure of the LLDPE resulting from the use of a Ziegler-type in lieu of a metallocene-type catalyst, by the presence as α -olefin comonomer of butene-1 as compared to a C₆-C₁₀ α -olefin, as well as by values of the memory effect ME and melt tension MT of the LDPE component Sumikasen[®] L705 (as set out in D15) which were lower than those required by Claim 1.
- (f) The problem underlying the claimed invention comprised several aspects relating on the one hand to the sealability characteristics of the blend of component A (hereinafter "LLDPE component") and component B (hereinafter "LDPE component") and on the other hand to its workability characteristics with regard to the claimed use for laminates.
- (g) Concerning the concrete properties summarised by the term "workability characteristics" the skilled reader of the patent in suit was directed to the worked examples of the patent which indicated some essential processing characteristics, including neck-in and take-off speed at break. It was part

of the existing technical problem of the opposed patent to provide a LLDPE/LDPE composition exhibiting an improved balance of these two processing properties.

- (h) That this partial problem has been solved by the specific features of the invention, and in particular by the higher ME values (i.e. not less than 2.3) of the LDPE component was apparent from a comparison of "inventive" Examples 1 and 16 with Example 14 (now comparative) of the patent specification. The latter example showed that a ME value below the specified lower limit resulted in higher neck-in properties, i.e. worse workability, while the higher ME values according to Examples 1 and 16 provided not only lower neck-in but also acceptable take-off speed at break.
- (i) A similar conclusion could be drawn from a comparison of the data concerning neck-in and take-off speed at break of, on the one hand Examples 9 and 10 (now comparative) and on the other hand "inventive" Examples 7 and 8.
- (j) Examples 7, 11 and 13 comprising different amounts of LDPE showed furthermore that the lower (i.e. less favourable) take-off speeds at break exhibited by compositions comprising higher amounts of LDPE was compensated by the lower (i.e. better) neck-in values of these compositions.
- (k) With respect to workability, D12A was concerned with combating fluctuation problems in resin film width and thickness but failed to address the

object of achieving a good balance of neck-in and take-off speed at break.

There was no information in D12A that these aspects of the existing technical problem could be solved by the modifications of the LLDPE and the LDPE components of D12A's Working Example 1 which would be necessary to bridge the gap between the compositions of this example and of the compositions according to present Claim 1.

- (l) This was *inter alia* highlighted by the use, according to all Worked Examples of D12A, of processing rates of (only) 15 and 30 m/min as compared with the much higher take-off speeds at break of up to 200< m/min exemplified in the patent.

- (m) There was moreover no reason for the skilled person to assume that a replacement of the Ziegler catalysed LLDPE of D12A by the metallocene catalysed EXACT LLDPEs of D17 (produced by the EXXPOL technology) would contribute to the claimed solution of the existing technical problem because the comonomer units of these EXACT LLDPEs were derived from butene-1 (i.e. not from a C₆-C₁₀ α-olefin). This deficiency could not be made up by the Respondent's reference to the ethylene/hexene-1 EXXPOL copolymers disclosed in D4 because that document related to LLDPEs only and was silent on their blends with LDPE.

- (n) Moreover, even if it was accepted that D4 confirmed that EXXPOL copolymers, like the EXACT

copolymers of D17, were very narrow CD (Composition Distribution) materials with copolymer molecules clustered tightly around a single comonomer content - with the consequence that these copolymers normally exhibited a TREF (Temperature Rising Elution Fractionation) peak within the temperature range specified in feature (c) of Claim 1 of the opposed patent - this could not prove that D17's EXACT copolymers necessarily had such a TREF characteristic; Comparative Examples 3, 6 and 10 of the opposed patent showed that LLDPEs prepared with a metallocene catalyst which in the majority of cases led to the claimed TREF characteristic could also give rise to a TREF characteristic outside the specified "inventive" area.

- (o) As to the alleged obviousness of the claimed subject-matter by a combination of D12A with document D9, namely a substitution of the therein disclosed "Ultralow Density Polyethylene (ULDPE)" TAFMER A varieties (according to D15 TAFMER A4085 and TAFMER A20090 satisfied the LLDPE criteria of present Claim 1) for the Ziegler catalysed LLDPEs of D12A there was, in view of the existing technical problem, no reason to select these specific TAFMER A varieties from the broader disclosure of D9.

VI. The arguments of the Respondent/Opponent submitted in its letters dated 7 January 2003 and 1 March 2004 as well as at the oral proceedings may be summarised as follows:

- (a) At the oral proceedings the Respondent dropped its previous objection against the compliance of the amended claims, especially Claim 18, with the requirements of Article 123(2) EPC.
- (b) The Claims now on file were not entitled to either one of the two priority dates because neither of the two priority documents disclosed all features of Claim 1.
- (c) The decision under appeal correctly concluded that Document D17 was prior art according to Article 54(2) EPC. The absence of a declaration by D17's author EXXON confirming the printing date 10/92 (October 1992) could not be held against the Respondent because the circumstantial evidence in D2 and D18 sufficed to discharge the burden of proof resting on the Respondent Opponent.
- (d) Document D20 should be entered into the proceedings because its submission by the Respondent was prompted by the Appellant's reliance in the Grounds of Appeal on the neck-in property of the compositions of Claim 1 and on the relevance therefor of an appropriately higher ME value of the LDPE component which together constituted a problem/solution approach entirely different from that underlying the decision under appeal.
- (e) The subject-matter of present Claim 1 was obvious over the disclosure of D12A in combination with D17 for the same reasons that applied to the subject-matter of the granted Claims. The

substance of the obviousness case was essentially unaffected by the further distancing of Claim 1's subject-matter from Working Example 1 of D12A by the narrower definition of the α -olefin units of the LLDPE component as well as by the higher minimum values of the ME and MT values of the LDPE component.

(f) Even assuming that the Appellant's afore-mentioned new problem/solution approach should be admitted - though in the Respondent's view it went beyond the original disclosure of the opposed patent - this would not render the claimed subject-matter inventive

(i) because according to D20 a decrease of neck-in was to be expected from an increase of memory effect and melt strength of the LDPE component, and

(ii) because this effect could not be achieved over the whole scope of Claim 1, i.e. could not be achieved for compositions comprising small amounts of LDPE, as was apparent from the value of 65 mm (18% of the T die width of 360 mm) for the composition of Example 11 comprising (only) 5% LDPE.

(g) The problem underlying the claimed invention could be clearly derived from the discussion of D12A's disclosure contained in page 2, lines 15 to 29 of the opposed patent. It *de facto* resided in the provision of analogous LLDPE/LDPE compositions having the satisfactory workability already

achieved according to D12A but furthermore having improved low-temperature heat sealability, heat sealing strength and hot tack.

- (h) The solution of this problem by switching from the Ziegler catalysed LLDPEs of D12A to the metallocene catalysed EXACT LLDPEs of D17 was obvious in view of the latter document's praise of the superiority of the sealability characteristics of these LLDPEs over conventional VLDPE (very low density polyethylene) polymers.
- (i) Since it was said in D17 that the EXACT polymers "reach the maximum line speed at substantially lower sealing temperatures", the skilled person was aware that the use of these polymers in lieu of the Ziegler catalysed LLDPEs of D12A would not impair the workability characteristics of D12A's LLDPE/LDPE blends which remained essentially unaffected by this change. According to D12A good workability characteristics could be provided by the LDPE component as long as the amount of this component would not exceed 60% by weight.
- (j) The Appellant's assertion of the achievement by the "inventive" compositions of a workability, in terms of neck-in and take-off speed at break, which was superior to that of the LLDPE/LDPE compositions according to D12A was at variance with the experimental evidence of the opposed patent.
 - (i) A comparison of the neck-in values of "inventive" Examples 11, 12, 1 and 13

(comprising identical LLDPE and LDPE components, the latter in percentages increasing from 5 to 15 to 25 to 45) rather showed that, fully in accordance with expectation, neck-in and take-off speed at break both decreased with increasing amount of LDPE. This showed that, within the claimed weight proportions, an unforeseeable balance of these properties was not obtained; rather high (and thus desirable) take-off speed at break corresponded to high (and thus undesirable) neck-in.

- (ii) The same conclusion could be drawn with regard to the series: Comparative Example 19/Examples 25/26/20/27 comprising increasing percentages of LDPE (0.05/5/15/25/45) and exhibiting decreasing values of neck-in (95/48/39/26/17) and take-off speed at break (200</200</165/76/59).
- (iii) Furthermore a rather favourable "balance of properties" was exhibited by Examples 9, 10, 14, 15, 23 and 24 (neck-in/take-off speed at break: 36/94, 45/100, 35/72, 45/80, 34/200<, 38/150), which by the rise of the minimum ME value of the LDPE component according to operative Claim 1 now became comparison, i.e. were outside the claimed scope.

- (k) In the absence of any unexpected technical effect evidenced for the amendment in Claim 1 of the number of carbon atoms of the α -olefin units of the LLDPE component from "3 to 18" to "6 to 10",

and in view of the facts that (i) D12A itself encompassed LLDPEs in that range, (ii) D17 referred to "EXXPOL Single-Site Polymers" comprising C₆ α-olefin units, and (iii) D4 disclosed EXXPOL hexene copolymers having a MI value and a density within the respective definitions of present Claim 1, this feature could not contribute an inventive step.

- (1) The same conclusion applied to the amended ME and MT values of the LDPE component of Claim 1 because, as set out previously, any effect associated with the amended higher minimum values of these properties was expected, not least in view of the information in D20 that an increase of these values would lead to lower neck-in.

VII. The Appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the set of claims filed with the letter of 18 June 2002.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

The appeal is admissible.

1. *Priority*

In application of Article 87 EPC as interpreted in G 2/98 (OJ EPO 2001, 413) it is decided that the patent in suit is not entitled to either of the two claimed

priorities because - failing to disclose the following features of Claim 1 - the respective priority documents do not disclose the same invention as required by Article 87(1) EPC.

(a) Priority document JP 323529/92 of 3 December 1992 does not disclose:

(i) the lower temperature limit of the TREF feature (c) of "from 20 to ... °C",

(ii) that according to said feature (c) the "elution curve may also indicate substantial elution volume at temperatures other than the temperature to which said peak corresponds",

(iii) a memory effect ME according to feature (c') of not less than 2.3,

(iv) the melt tension MT feature (d');

(b) Priority document JP 345750/92 of 25 December 1992 does not disclose:

(i) the temperature range according to said feature (c) of the peak of the TREF curve,

(ii) the melt tension MT feature (d').

2. *Article 123(2) and (3) EPC*

Claim 1 of the amended set of claims is duly based on the original disclosure of the patent because the

amended features are taken from the general description of components A (LLDPE) and B (LDPE) which, in the absence of any disjunctive limitation, must be considered to form the pool of information from which, in the present case, literally "new combinations" of separately disclosed features of the components of a composition can be created without going beyond the content of the application as filed; the skilled reader readily recognises from the structure of the respective parts of the specification that the amended features are functionally unrelated fallback positions whose combinations are each intended to provide a solution to the technical problem recognizable from the patent/application.

Support for the new features is found as follows:

- for the feature that the number of carbon atoms of the α -olefin part of component A is from "6 to 10":
page 11, lines 16 to 19 of the application as filed (page 5, lines 35 to 36 of the patent specification),
- for the feature that the memory effect (ME) of component B is "not less than 2.3":
page 13, lines 10 to 14 of the application as filed (page 6, lines 21 to 22 of the patent specification),
- for the feature that the melt tension (MT) of component B is "not less than 5g":
page 14, lines 4 to 7 of the application as filed (page 6, lines 38 to 39 of the patent specification).

The new features limit the scope of protection of granted Claim 1.

The same considerations apply to Claims 18 and 19. The text of the other claims is unamended.

Thus all claims on file comply with the requirements of Article 123(2) and (3) EPC.

3. *Procedural matter/late filed document*

The Respondent's filing of document D20 with its letter of response to the Statement of Grounds of Appeal was prompted by the new problem/solution approach formulated by the Appellant Patentee for the first time in said Statement (cf. section VI (d) above). In view thereof and because D20 is clearly of relevance in that respect it is admitted for consideration in this appeal.

4. *Prior art status of D17*

The Board concurs with the conclusion drawn by the decision under appeal that this document had been printed in October 1992 and was available to the public before the effective filing date of the opposed patent (cf. section III above).

In its judgment, the facts outlined in paragraph V (c) above can lead to no other conclusion than that the middle section "-1092-" of the code "119-1092-0019-A" relates to the printing date 10/92.

By submitting in evidence D2 and D18 which exhibit analogously structured codes but contain supplementary information elucidating the correspondence between the printing date and the middle section of the codes, the Respondent Opponent has sufficiently discharged its burden of proof and there was no need to additionally provide further confirmation from D17's author. It is common practice in industry to codify information, including printing information, on commercial literature in that fashion and on the balance of probabilities and in view of the corroborating evidence in D2 and D18 no other conclusion can be arrived at.

Considering the time lapse of more than a year between this printing date and the effective filing date of the patent in suit (2 December 1993), it is beyond reasonable doubt that D17 was available to the public before that filing date because it would go against common sense to assume that information that is intended for the public (here: customers) would be withheld from publication over such long a period of time (cf. Reasons 3 of T 743/89 mentioned supra).

5. *Novelty*

Novelty was not an issue in these proceedings and the Board sees no reason to raise it either.

6. *Closest state of the art*

6.1 There is agreement between the parties that document D12A represents the closest state of the art. This document is also identified as starting point for the

claimed invention in the opposed patent (page 2, lines 24 to 29).

- 6.2 D12A *inter alia* relates to an extrusion lamination composition prepared by blending from 10 to 60 % by weight of a high pressure low density polyethylene having a melt tension of from 4 to 15 g [i.e. LDPE] with a copolymer of ethylene and α -olefin containing from 3 to 18 carbon atoms having a density of from 0.895 to 0.955 g/cm³ and from 5 to 40 short chain branches (SCB) per 1000 carbon atoms [i.e. LLDPE] (claim statement (1)).

The LLDPE copolymer may also be a mixture of a low density component A (0.895 to 0.935 g/cm³) of relatively high molecular weight (viscosity number 1.5 to 6.0 dl/g) with SCB 7 to 40 and of a higher density component B (0.910 to 0.955 g/cm³) of relatively low molecular weight (viscosity number 0.3 to 1.5 dl/g) with SCB 5 to 30 (claim statement (2)).

- 6.3 It is stated in D12A (page 3, second paragraph to page 4, first paragraph; page 5, lines 6 to 11) that compositions obtained by blending LLDPE and LDPE in the specified weight proportions do not suffer from the drawbacks exhibited by LLDPE alone when subjected to extrusion lamination, namely unacceptable fluctuations in film width and thickness and an increased power requirement at high processing speed, but that such compositions exhibit a good performance at high speed processing, as well as *inter alia* good hot tack and heat seal strength associated with LLDPE.

- 6.4 Working Example 1 (pages 16/17) discloses a blend comprising 25% LDPE (SUMIKASEN® L705; melt tension: 8g) and an ethylene/butene-1 LLDPE (density 0.923 g/cm³ (i.e. within the range of feature (b) of present Claim 1), SCB 21) which is extrusion laminated on stretch nylon that had been extrusion coated with SUMIKASEN.
- 6.4.1 This Example does not explicitly indicate the LLDPE's MFR (= melt index MI) but it can be assumed (as according to paragraph 5 of section II of the decision under appeal, not questioned by the Appellant), on the basis of the MI of 3 indicated for the two-step ethylene-butene-1 copolymer used according to Working Examples 2 to 4 as well as on the basis of the broad overlap of the MI range of 0.2 to 50 g/10 min with that of present Claim 1 (2 to 30 g/10 min), that this property complies with the requirement of present Claim 1 (feature (a)).
- 6.4.2 Contrastingly, feature (c) of present Claim 1 (temperature rising elution fractionation (TREF) having a peak in the range of from 20 to 85°C) is not met by the LLDPEs used according to D12A which have been prepared with Ziegler or Phillips type catalysts (page 9, lines 12 to 20). Because of their much broader compositional distribution it is common general knowledge that so prepared LLDPEs do not have a single peak with a H/W ratio ≥ 1 in that temperature range (cf. page 55 of document D4, submitted at the opposition oral proceedings as document D4a).
- 6.4.3 The relevant characteristics of the LDPE component SUMIKASEN (or SUMIKATHENE) L705 used in D12A's Example

1, as submitted by the Respondent Opponent in document D15 are:

MFR: 6.9 g/10 min; density: 0.920; ME: 2.0; MT (determined according to the patent in suit): 4.2.

6.4.4 Table 1 on page 19 of D12A *inter alia* indicates a coating width for the coatings of Example 1 of 520 and 527 mm, depending on the processing rate of 15 or 30 m/min. In view of the T die width of 600 mm (page 16, line 4 from bottom) this amounts to approximate neck-in values of, respectively, 13% and 12%.

6.5 The compositions of Working Example 1 of D12A thus fail to meet the following features of present Claim 1:

- (i) the number of carbon atoms of the α -olefin units of the LLDPE component,
- (ii) TREF feature (c) of the LLDPE component,
- (iii) ME feature (c') of the LDPE component, and
- (iv) MT feature (d') of the LDPE component.

As opposed to the TREF feature (c), which was already distinguishing over granted Claim 1, the other three features became distinguishing over Working Example 1 of D12A only by the narrower definitions introduced into the present amended version of this claim.

7. *Problem to be solved*

7.1 According to the patent specification the claimed invention is concerned with the provision of a resin

composition for laminates that has excellent properties with respect to low-temperature heat sealability, heat sealing strength, hot tack, etc. not achieved by conventional materials, and that also has improved workability (page 2, lines 38 to 41).

By "conventional materials" in that problem definition reference is obviously made in particular to the LLDPE/LDPE compositions of JP-A-58-194935 (= D12) discussed on page 2, lines 24 to 29.

This object is said to be achieved if a specific LLDPE is selected, and is blended with a specific LDPE (page 2, lines 42 to 43).

7.2 It is uncontested by the Respondent Opponent that the afore-mentioned excellent properties with regard to low-temperature heat sealability, heat sealing strength and hot tack are effectively achieved by the laminates to be used according to present Claim 1 and, in view of the experimental evidence in the patent specification, the Board sees no reason to deviate from that stance.

7.3 The workability aspect of the patent's problem definition is not made an issue in the detailed description of the claimed invention in the patent specification. From this and from the reference to the possible achievement of "satisfactory workability" with the afore-mentioned compositions of JP-A-58-194935 (= D12) the skilled reader gets the impression that the term "improved workability" (emphasis by the Board) in the afore-mentioned problem formulation rather relates to prior art other than D12.

In the appeal and particularly at the oral proceedings the Appellant wanted to rely on the experimental data contained in the patent specification as evidence for the *de facto* achievement of an improvement of the workability.

- 7.3.1 In particular, the Appellant argued that the higher ME (and MT) values of the LDPE component to which Claim 1 was now restricted led to "better workability, especially concerning the neck-in values" (Grounds of Appeal, page 6, 4th paragraph).
- 7.3.2 At the oral proceedings the Appellant supplemented this argument by alleging that higher ME values of the LDPE component were associated with a favourable balance of the workability properties neck-in and take-off speed at break. The other processing properties (surging and resin pressure) referred to in Tables 1 and 2 of the patent specification have not been addressed by the Appellant in this appeal.
- 7.3.3 In view of the fact that this problem/solution approach is not as such mentioned in the opposed patent (and in the original application) it can only be taken into account as part of the existing technical problem if it can be clearly inferred by the skilled reader from the experimental evidence in the patent (Article 123(2) EPC). In such a situation the onus is on the Appellant Patentee to establish its case in that respect (cf. Case Law of the Boards of Appeal, 4th edition, I.D.4, section "4.5 Reformulation of the problem", pages 108 to 110; Reasons 4.5 and 4.9 of T 1188/00 from 30 April 2003, not published in the OJ EPO).

7.3.4 In the Board's judgment, said evidence is however not able to support the Appellant Patentee's assertion that the use of the polymer compositions specified in present Claim 1 gave rise to an improved workability, specifically in terms of a favourable balance of the properties neck-in and take-off speed at break allegedly achieved by the choice of an LDPE component exhibiting a ME value of not less than 2.3 in combination with an MT value of not less than 5 g.

7.3.5 The Appellant's reliance in this respect on a comparison of Examples 1, 14 (now comparative) and 16, all using the same LLDPE component, is not convincing because differences in the characteristics (hereinafter printed in bold) of the LDPE other than the different ME values make it impossible to establish a causative relationship between changes of these values and changes of the neck-in and/or take-off speed at break properties during the manufacture of a laminate.

	Example 1	Example 14*	Example 16
<u>LDPE:</u>			
MFR (g/10 min)	4	4	13
density (g/cm ³)	0.92	0.92	0.92
ME	2.4	2.1*	2.4
MT (g)	10.2	6.8	8.8
Q value (Mw/Mn)	10	6.3	12
ratio LLDPE/LDPE	75:25	75:25	75:25
<u>properties:</u>			
neck-in (mm)	28	35	28
take-off speed at break (m/min)	72	72	72

* outside definition of Claim 1

7.3.6 For the same reasons no other conclusion can be arrived at by a comparison of Examples 7, 8, 9 and 10; in the case of Example 7 a conclusion on the interdependence of changes of the ME value and of the workability is furthermore hampered by a different Q value of the LLDPE component:

	Example 7	Example 8	Example 9*	Example 10*
<u>LLDPE</u>				
Q value (Mw/Mn)	3.0	1.9	1.9	1.9
<u>LDPE:</u>				
MFR (g/10 min)	4	0.5	18	20
density (g/cm ³)	0.92	0.92	0.92	0.92
ME	2.4	2.9	2.1*	1.8*
MT (g)	10.2	15.5	4.7*	3.8*
Q value (Mw/Mn)	10	14	17	15
ratio				
LLDPE/LDPE	75:25	75:25	75:25	75:25
<u>properties:</u>				
neck-in (mm)	22	20	36	45
take-off speed	70	56	94	100
at break (m/min)				

* outside definition of Claim 1

7.3.7 Nor can a comparison of Examples 24 (now comparative), 25, 26 and 27 demonstrate any superior balance of the properties neck-in and take-off speed at break, in this case also because of the different LLDPE/LDPE weight ratios:

	Example 25	Example 26	Example 24*	Example 27
<u>LDPE:</u>				
MFR (g/10 min)	4	4	2	4
density (g/cm ³)	0.92	0.92	0.92	0.92

ME	2.5	2.5	1.6*	2.5
MT (g)	12.3	12.3	6.6	12.3
Q value (Mw/Mn) ratio	12	12	7	12
LLDPE/LDPE	95:5	85:15	75:25	55:45
<u>properties:</u>				
neck-in (mm)	48	39	38	17
take-off speed at break (m/min)	200<	165	150	59

* outside definition of Claim 1

7.3.8 It is apparent from the afore-mentioned comparison data that an increase of the LDPE's ME value (and/or MT value) cannot unambiguously be identified as source of a particularly favourable balance of the properties neck-in and take-off speed at break.

7.3.9 The provision of a LLDPE/LDPE composition suitable for laminates which provides such a balance of properties cannot be recognized therefore as an aspect of the problem underlying the claimed subject-matter that was within the content of the original application.

7.3.10 The only conclusion that can be drawn from the experimental evidence in the opposed patent with respect to the workability aspect of the problem underlying the claimed subject-matter is that - as finally stated by the Appellant at the oral proceedings - it comprises the provision of compositions which are optimized with regard to either neck-in or take-off speed at break.

Reference is made in this respect to the low neck-in values (20, 20, 18, 18, 17) of the compositions of Examples 3, 8, 13, 22 and 27 and to the high take-off speeds at break (200<, 170, 200<, 165) of the compositions of Examples 11, 12, 25 and 26). In each of these cases the corresponding other property (i.e. take-off speed at break, respectively, neck-in) is less than optimal.

- 7.4 In view of the above analysis, the problem objectively underlying the claimed invention can be seen in the provision of a LLDPE/LDPE resin composition for laminates that has excellent properties with respect to low-temperature heat sealability, heat sealing strength and hot tack, and which can be tailored in a way to exhibit low neck-in or high take-off speed at break.

8. *Obviousness*

- 8.1 This issue turns on the question whether it is obvious for the skilled person starting from the disclosure of D12A, particularly its Working Example 1, to arrive at the claimed solution of the existing technical problem.

- 8.2 Document D17 discloses that LLDPE EXACT polymers are particularly useful for adhesive lamination. Blends with 20 % by weight of a LDPE provide lower temperatures at which the required hot tack and seal strength levels are achieved than analogous (Ziegler-Natta) VLDPE containing blends. D17 furthermore discloses that with these polymers a maximum line speed at substantially lower sealing temperatures may be achieved. Apart from the specially exemplified ethylene butene LLDPEs EXACT 3010 and EXACT 3027, D17 also

discloses "EXXPOL Single-Site Polymers" SVLDPE and SLLDPE comprising C₆ comonomer units (heading of page 1: "Products From EXXPOL[®] Technology"; page 1, left hand column; page 1, right hand column, first and second paragraph, lines 7 to 9 from bottom; page 2, diagram on top of the left hand column, diagram at the bottom of the right hand column).

8.3 In view of the fact that D17 discloses LLDPE/LDPE compositions providing sealing properties which, because of the use of the new EXACT LLDPEs, are superior to those of blends of LDPE with Ziegler-Natta VLDPE and which are suitable for high speed processing the skilled person looking for a solution of the existing technical problem is incited to try out these EXACT LLDPEs in lieu of the conventional (e.g. Ziegler-Natta) LLDPEs used according to D12A.

8.4 By doing so one arrives at LLDPE/LDPE compositions which can be considered to meet the TREF feature (c) of present Claim 1 because this characteristic is typical for metallocene catalysed (single-site) LLDPEs.

8.4.1 This fact, which had not been contested by the Patentee before the first instance, is established by

(a) the emphasis in document D4 (page 46, second paragraph; page 47, second paragraph; page 48 last paragraph) on the narrow composition distribution (CD) of EXXPOL polymers and the possibility to determine CD by the TREF method in combination with the TREF diagram for EXXPOL in document D4a,

(b) and with respect to EXACT 3027, one of the two EXACT LLDPEs identified in D17, by the TREF diagram submitted by the Respondent with its letter dated 1 March 2004.

8.4.2 The argument advanced by the Appellant at the appeal oral proceedings that metallocene catalysed LLDPE need not inevitably exhibit a TREF peak in the temperature range specified in present Claim 1 (see section V (n) above) cannot detract from the fact that such a TREF characteristic is typical for the metallocene catalysed EXACT polymers produced by the EXXPOL technology as is furthermore demonstrated by the TREF diagrams for EXACT 4011 (referred to in D18) and EXACT 3132 (a LLDPE comprising hexene units as referred to in D4 (page 48, last paragraph) which are also attached to the Respondent's letter dated 1 March 2004.

8.4.3 The general character for metallocene catalysed LLDPE of a TREF characteristic according to feature (c) of Claim 1 is also confirmed by the very broad and variable preparation methods for these polymers described in the patent specification itself (page 4, line 44 to page 5, line 49) which are all intended to lead to the compliance with this requirement as well as by the fact that the vast majority of the metallocene catalysed LLDPEs exemplified in the patent specification indeed conform with this TREF characteristic.

8.5 It was argued by the Appellant that the question whether it was obvious to substitute, in view of their favourable sealing characteristics, the metallocene catalysed EXACT LLDPEs for the conventional LLDPEs of

D12A was not decisive for the inventive step assessment because D17 was anyway silent about the improved workability characteristics to be achieved according to the patent in suit.

8.5.1 However, in the Board's judgment, nothing can be gained from this argument for the Appellant's case because

- (a) the alleged improvement of a particularly favourable balance of the properties neck-in and take-off speed at break cannot be recognised as part of the existing technical problem as set out above (section 7.3 to 7.3.9), and
- (b) the achievement, in addition to the improved sealability characteristics, of either low neck-in or high take-off speed at break without a corresponding improvement of the other property is a matter of routine experimentation.

8.5.2 It is noted in that respect that the neck-in values of about 12 and 13% according to Working Example 1 of D12A (cf. section 6.4.4 above) are in the order of magnitude of the neck-in values of some of the "inventive" Examples of the patent in suit: the neck-in values of 43, 48 and 39 mm according to "inventive" Examples 12, 25 and 26 correspond to about 12, 13 and 11% neck-in. It is remarkable that these neck-in values, to which correspond high take-off speeds at break (170, 200, 165) are far worse than the lowest (best) values of 4.5 and 5% of "inventive" Examples 22 and 27 which, however, correspond to much lower take-off speeds at break (50, 59). This shows again that the "antagonistic" behaviour

of these two properties is not reconciled by the claimed invention to a surprisingly favourable balance.

- 8.5.3 That the optimisation of one of these properties at the expense of the other one is a matter of routine experimentation which does not require an inventive effort is established by D1 which discloses that the measures to be taken in order to separately influence these two properties have been in the public domain.

In particular, this document - that is particularly relevant because it is also concerned with LLDPE/LDPE blends for extrusion coating - contains the following statements:

- (a) "High pressure, low density polyethylene resins tend to build up stress at high extrusion coating rates and drawdowns in an extrusion coating process. When the "high pressure" resins reach a point where the stress exceeds the melt strength, the resins break or rupture. In contrast to the behavior of high pressure, low density polyethylene resins, low pressure, low density ethylene hydrocarbon copolymer resins can be drawn down considerably without reaching stresses to cause melt breakage." (column 6, line 62 to column 7, line 3).
- (b) "As can be seen in FIG. 5, addition of up to about 60 weight percent of a linear, low density resin to this particular blend was possible before neck-in exceeded 3 inches." (column 7, lines 41 to 44).

8.5.4 That these separate influences of the LLDPE and the LDPE components on the neck-in and take-off speed at break properties of their blends are indeed exhibited by the compositions according to present Claim 1 is not only demonstrated by the respective data of Examples 24 to 27 (cf. section 7.3.7 above) but also confirmed by the results of Examples 11, 12, 1 and 13 which use the same LLDPE and LDPE components in different proportions which also show that, in accordance with expectation, higher amounts of LLDPE favour higher take-off speeds at break while higher amounts of LDPE favour lower neck-in:

	Example 11	Example 12	Example 1	Example 13
ratio				
LLDPE/LDPE	95:5	85:15	75:25	55:45
<u>properties:</u>				
neck-in (mm)	65	43	28	18
take-off speed at break (m/min)	200<	170	72	59

8.5.5 Therefore the formulation of LLDPE/LDPE compositions which either have low neck-in or high take-off speed at break without a concomitant enhancement of the other property (see section 7.3.10 above) cannot provide an inventive step.

8.6 The question remaining with regard to the issue of obviousness is whether the further differences between the compositions according to Working Example 1 of D12A and those according to present Claim 1, i.e. features (i), (iii) and (iv) set out in section 6.5 above, involve an inventive step.

- 8.6.1 As to the afore-mentioned feature (i), i.e. the use of an LLDPE component whose α -olefin units comprise 6 to 10 carbon atoms, it is plausible in view of the disclosure of D17, which extends to EXACT LLDPEs having C_6 α -olefin units - which according to the TREF diagram for the hexene comprising EXACT 3132 attached to the Respondent's letter dated 1 March 2004 meets this feature (c) of the present Claim 1 - that the relevant characteristics of such LLDPEs will not essentially deviate from those of the butene comprising EXACT 3010 and 3027 LLDPEs in regard to which the favourable sealing properties, the high attainable line speed inclusive, are especially emphasised in D17. The obviousness conclusion drawn with regard to the use of the latter LLDPEs applies therefore as well to LLDPEs having C_6 to C_{10} α -olefin units.
- 8.6.2 Nor can an inventive step be attributed to features (iii) and (iv) referred to in the afore-mentioned section 6.5, i.e. the ME value of the LDPE component of not less than 2.3 and the MT value of not less than 5g, because the skilled person was aware from D20 that an increase of these values would lead to lower neck-in. This results from the statement in D20 (page 62, penultimate paragraph): "Neck-in decreases as polymer melt strength and memory increase".
- 8.7 The subject-matter of present Claim 1 is therefore obvious over the disclosure of document D12A in combination with document D17.
9. In view of this conclusion there is no need to consider the parties' arguments with respect to document D9.

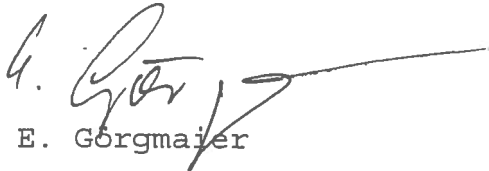
10. The patent cannot therefore be maintained on the basis of the amended set of claims submitted with the Grounds of Appeal.

Order

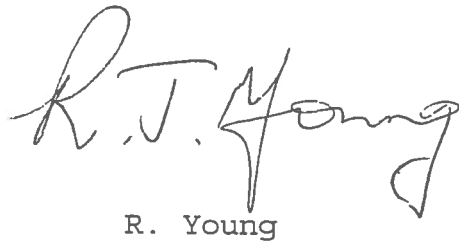
For these reasons it is decided that:

The appeal is dismissed.

The Registrar:


E. Gorgmaier

The Chairman:


R. Young

