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Datasheet for the decision of 20 July 2016

Case Number: T 1075/13 - 3.3.03

Application Number: 04768050.9

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IPC: C08L23/08, C08L23/06, C08J5/18

Language of the proceedings: EN

Title of invention:
POLYMER BLENDS

Patent Proprietor:
Ineos Sales (UK) Limited

Opponent:
The Dow Chemical Company

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Inventive step - All requests (no)

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Case Number: T 1075/13 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 20 July 2016

Appellant: (Opponent)	The Dow Chemical Company 2030 Dow Center Midland, MI 48674 (US)
Representative:	V.O. P.O. Box 87930 2508 DH Den Haag (NL)
Respondent: (Patent Proprietor)	Ineos Sales (UK) Limited Hawkslease Chapel Lane Lyndhurst Hampshire SO43 7FG (GB)
Representative:	Hawkins, David George Mathisen & Macara LLP Communications House South Street Staines-upon-Thames, Middx TW18 4PR (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 7 March 2013 rejecting the opposition filed against European patent No. 1656420 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	F. Rousseau
Members:	D. Marquis
	R. Cramer

Summary of Facts and Submissions

I. The appeal by the opponent lies with the decision of the opposition division posted on 7 March 2013 rejecting the opposition against European patent No. 1 656 420.

II. Claim 1 of the patent as granted read as follows:

"1. A polymer blend comprising
(a) 1-99% by weight of a copolymer of ethylene and an alpha olefin having from 3 to 10 carbon atoms, said copolymer having
(i) a density in the range 0.905 to 0.940 g cm^{-3},
(ii) a melt elastic modulus G' (G"= 500 Pa) in the range 10 to 150 Pa, and
(iii) a melt index in the range 5 to 50, and
(b) from 1 - 99% by weight of a low density polyethylene (LDPE) polymer having a density from 0.914 to 0.928 g cm^{-3} wherein the sum of (a) and (b) is 100 %."

III. A notice of opposition against the patent was filed in which the revocation of the patent was requested on the grounds according to Article 100(a) EPC (lack of novelty and lack of inventive step).

IV. The decision was based on the main request (claims as granted). The following documents were inter alia cited in opposition:
D5: US-B-5 395 471;
D13: C.K.Chai et al., "Influence of molecular weight distribution on LLDPE blown film processing conditions and property sensitivity", ANTEC 2000, Orlando, Florida, 7-11 May 2011;

D14: J.F. Vega et al., "Rheological criteria to characterize metallocene catalyzed polyethylenes", Macromol. Chem. Phys., 200, pages 2257-2268, 1999.

V. The opposition division found that the claims of the main request were novel in a particular over D5. In particular, it had not been demonstrated that the value of the melt elasticity modulus of the copolymer of ethylene and alpha olefin disclosed in these documents were in the claimed range. D5 was the closest prior art. From that document, the technical problem was the provision of an alternative polymer blend suitable for extrusion coating applications. None of the documents cited pointed to the claimed subject matter. The subject matter of the claims of the patent in suit was inventive.

VI. With letter of 3 Mai 2013, the opponent lodged an appeal against the decision of the opposition division. The statement setting out the grounds of the appeal was filed with letter of 5 July 2013.

VII. The reply to the statement of grounds of the appeal was filed with letter of 20 February 2014.

VIII. With letter of 15 October 2014, the appellant submitted a letter containing further arguments concerning novelty and submitted the following documents:
D18: WO 93/08221
D19: Rheological Principles, Measurements, and Applications
D20: Declaration of Mr Mark S. Johnson
D21: Declaration of Mr Jian Wang

IX. With letter of 27 February 2015, the respondent submitted two sets of claims as auxiliary requests.

Claim 1 of the first auxiliary request read as follows:

"1. A polymer blend comprising
(a) 1-99% by weight of a copolymer of ethylene and an alpha olefin having from 3 to 10 carbon atoms, said copolymer having
(i) a density in the range 0.905 to 0.940 g cm^{-3},
(ii) a melt elastic modulus G' (G"= 500 Pa) in the range 10 to 150 Pa, and
(iii) a melt index in the range 12 to 50, and
(b) from 1 - 99% by weight of a low density polyethylene (LDPE) polymer having a density from 0.914 to 0.928 g cm^{-3} wherein the sum of (a) and (b) is 100 %."

Claim 1 of the second auxiliary request read as follows:

"1. A polymer blend comprising
(a) 1-99% by weight of a copolymer of ethylene and an alpha olefin having from 3 to 10 carbon atoms, said copolymer having
(i) a density in the range 0.905 to 0.940 g cm^{-3},
(ii) a melt elastic modulus G' (G"= 500 Pa) in the range 10 to 150 Pa, and
(iii) a melt index in the range 12 to 50, and
(iv) a Mw/Mn in the range of 2 to 3.5, and
(b) from 1 - 99% by weight of a low density polyethylene (LDPE) polymer having a density from 0.914 to 0.928 g cm^{-3} wherein the sum of (a) and (b) is 100 %."

X. With letter of 22 April 2015, the appellant filed arguments concerning the auxiliary requests.

XI. In a communication according to Article 15(1) RPBA in preparation for oral proceedings, the Board summarised the points to be dealt with.

XII. Oral proceedings were held on 20 July 2016.

XIII. The arguments of the appellant, as far as they are relevant to the present decision, can be summarised as follows:

Novelty and Inventive step in view of D5

Main request

Claim 1 of the main request lacked novelty or inventive step in view of D5. D5 disclosed a polyethylene blend according to the main request for which the value of the elastic modulus of the LLDPE copolymer corresponding to component (a) of claim 1 was not disclosed. D18-D21 showed that the blends of D5 had an elastic modulus within the claimed range. Also, there was no improvement of any property shown in the patent in suit as a result of the selection of an elastic modulus within the range of claim 1 of the main request. The only technical problem that could be derived was the provision of alternative blends. The claimed range of elastic modulus was common for that type of LLDPEs as shown in D13 and D14. The choice of a blend with an LLDPE within the claimed range to solve the posed problem was obvious.

First and second auxiliary requests

Both requests were late filed and should not be admitted into the proceedings. D5 already disclosed that the substantially linear copolymers had a melt

index in a range overlapping that of claim 1 of both auxiliary requests. As to the molecular weight distribution, it was also already disclosed in D5. As there was no evidence of an improvement related to either the melt index or the molecular weight distribution, the claimed subject matter was obvious in view of D5 alone. None of the two auxiliary requests involved an inventive step.

XIV. The arguments of the respondent, as far as they are relevant to the present decision, can be summarised as follows:

Novelty and inventive step in view of D5

Main request

The documents D20 and D21 were late filed and should therefore not be admitted into the proceedings. D5 did not disclose the elastic modulus of the substantially linear copolymers of the blend. It was not disputed that D5 was the closest prior art. The patent in suit showed that the blends according to claim 1 had multiple melting peaks and excellent hot tack strength. D5 indicated that the blends were characterised by a single melting peak and the hot tack strength was not mentioned in that document. The technical problem solved by the claimed subject-matter vis-à-vis D5 was therefore to provide blends for extrusion coating applications which are improved in hot tack strength. The component (a) of the patent was prepared by gas phase polymerisation, which provided the resulting copolymer with unique rheological properties, as exemplified by its elastic modulus. There was no incentive in D5 towards a blend with a copolymer having an elastic modulus within the claimed range. The

examples of the patent in suit showed that the claimed blends had been improved. The main request was inventive in view of D5 as the closest prior art.

First and second auxiliary requests

Both requests were filed in response to the novelty attack of the appellant based on the late filed documents D20 and D21. These requests should therefore be admitted into the proceedings. The first request limited the melt index to a range that was not disclosed in the examples of D5. D5 did not give an incentive towards the ranges of melt index and molecular weight distribution as claimed in the auxiliary requests. The patent in suit contained comparative examples of blends for which the melt index or the molecular weight distribution were outside the claimed range. The first and second auxiliary requests involved an inventive step.

XV. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

XVI. The respondent requested the dismissal of the appeal or that the decision under appeal be set aside and the patent be maintained on the basis on any of the two auxiliary requests filed with letter of 27 February 2015.

Reasons for the Decision

Main request

1. Novelty and inventive step in view of D5

1.1 Novelty of claim 1 in view of D5 was discussed at the oral proceedings. It was not in dispute between the parties that D5 did not disclose the melt elastic modulus G' (G''=500 Pa) of polyethylene copolymers so that on the basis of D5 alone it could not be concluded that the polymer blends disclosed in D5 anticipated the subject matter claimed in the main request. Additional evidence D16a-D21 was filed by the appellant during the appeal procedure that aimed to show that the copolymers of ethylene disclosed in the examples of D5 had a melt elastic modulus G' (G''=500 Pa) within the claimed range. Arguments relating to the admissibility and the relevance of this evidence were submitted by the parties. In view of the negative outcome in respect to inventive step of the claimed subject matter over D5 as set out below, a decision of the Board relating to that evidence filed during the appeal proceedings is unnecessary.

Closest prior art

1.2 The contested decision of the opposition division was based on D5 as the closest prior art. D5 was also considered by the appellant to be the closest prior art. This was not disputed by the respondent and the Board has no reason to take a different view. That document discloses blends of a substantially linear

ethylene polymer and a high-pressure ethylene polymer or linear ethylene polymer for extrusion coating.

1.3 In particular, blends for extrusion coating that are composed of a base polymer (Samples A, B, C, M, N, F) and a high pressure ethylene polymer (LDPE, EMA or EAA) are reported in Table 9 of D5. Example 17 of that table represents a blend comprising 82 wt% of a copolymer Sample C and 18 wt% of LDPE. The copolymer sample C is a substantially linear LLDPE having a density and a melt index according to component (a) of claim 1 of the main request, as reported in Table 1 of D5 (density of 0.910 g cm^{-3} and a melt index of 9.4 g/10 min.). The elastic modulus G' (G''=500 Pa) of that copolymer is however not disclosed in D5. The high pressure low density polyethylene LDPE of example 17 is disclosed in Table 8 of D5 as sample O. It has a density of 0.923 g cm^{-3}, i.e. within the range given for component (b) of claim 1 of the main request. Thus, apart from the elastic modulus G' (G''=500 Pa) which is not provided in D5, the blend of example 17 is otherwise according to claim 1 of the main request. The values reported in Table 9 also show that that blend displays, relative to the other blends, a low neck-in (9.9 cm) and a high drawdown (>610 m/min). That example constitutes the disclosure in D5 that is the closest to the claimed subject matter.

Problem and solution

1.4 Having regard to the disclosure of D5, the respondent submitted that the technical problem solved by the subject-matter of claim 1 of the patent in suit was to provide blends for extrusion coating applications which were improved in hot tack strength, whereas the appellant formulated the technical problem solved over

D5 as the provision of alternative blends. The respondent relied on the experimental data of the patent in suit in support of is contention that the claimed blends indeed provided the alleged improvement. The patent in suit contains a number of examples of blends based on LLDPE copolymer as component (a) and LDPE as component (b). The properties of the LLDPE components (a) (density, melt index, elastic modulus G') are disclosed in Table 1 and the densities of the LDPE components (b) are disclosed in Table 2. The composition of the blends obtained from the components (a) and (b) and their properties (density, melt index, elastic modulus, activation energy, molecular weight distribution and melting temperatures) are reported in Table 3. Beyond low neck-in and high drawdown, it is asserted in paragraphs 91 and 137 of the patent in suit that the claimed blends are also improved in that they exhibit more than one melting peak at low melting temperatures between 30°C and 150°C as well as an excellent hot tack strength. However, the patent in suit does not disclose any values of the drawdown, neck-in and hot tack strength properties that would allow a comparison of the blends produced. As to the peak melting temperatures, the values reported in Table 3 do show that the blends according to the patent in suit are characterised by several melting peaks that are in the range of 30 to 150°C. However, a blend corresponding to the disclosure of D5 is not provided in the patent in suit. The comparative blend disclosed in paragraph 136 differs from the claimed blends in that the density of the copolymer component (a) (0.902 g cm^{-3}) is outside the claimed range (0.905-0.940 g cm^{-3}). Since that comparative blend is not representative of the blends according to D5, it cannot show the presence of an alleged improvement over the closest prior art D5. In that respect, it was not

disputed that the passage of D5 referring to the presence of a single melting peak in column 7, line 10 did not pertain to the polymer blend as such but only referred to the substantially linear homopolymer that corresponds to the copolymer component (a) of the patent in suit.

1.5 According to the case law of the boards of appeal, alleged but unsupported advantages to which the patent proprietor merely refers without offering sufficient evidence to support the comparison with the closest prior art cannot be taken into consideration in determining the problem underlying the invention. Since in the present case the alleged improvement in hot tack strength was not made credible, the technical problem as defined by the respondent needs reformulation. The technical problem that can be derived from the patent in suit is therefore the mere provision of alternative blends of copolymers of ethylene and alpha olefins and LDPE. As solution to this problem, the patent in suit proposes the polymer blend of claim 1 characterised by a melt elastic modulus G' (G''=500Pa) in the range of 10 to 150 Pa.

Obviousness

1.6 Starting from the blends of example 17 of D5, the question that remains to be answered is whether the blends according to claim 1 of the main request, for which the copolymer component (a) has a melt elastic modulus G' (G''=500 Pa) in the range of 10 to 150 Pa, were an obvious solution to the problem posed.

1.7 The melt elastic modulus G' (G''=500 Pa) of the copolymer component (a) defining the claimed subject matter is disclosed in paragraph 11 and its measurement

at 190°C in paragraph 129 of the patent in suit. The melt elastic modulus is nowhere disclosed as a critical feature for the blends of the patent in suit. All the examples provided in the patent in suit contain an LLDPE copolymer component (a) having a melt elastic modulus of between 10.8 and 28.7 g/10 min according to Table 1, that is within the claimed range of 10 to 150 g/10 min. There is no example of a copolymer component (a) having a melt elastic modulus outside that range. On the basis of the information provided in the patent in suit, it cannot be concluded that the choice of a copolymer component (a) having a value of melt elastic modulus within the claimed range is critical to the properties of the blend in view of its application in extrusion coating. In that respect, the documents D13 and D14 actually show that the melt elastic modulus G' of known metallocene catalyzed polyethylenes at G''=500 Pa can generally be higher than 10 Pa (D13: 33 Pa, 55 Pa and 80 Pa on Table 3 on page 335; D14: from figure 8 on page 2262). On that basis, the claimed range of 10 to 150 Pa is considered to correspond to ordinary LLDPEs.

1.8 The argument that the substantially linear LLDPE copolymers of D5 corresponding to components (a) of claim 1 were obtained by a solution polymerisation process that was so different from the gas phase polymerisation disclosed in the patent in suit that their melt elastic modulus G' could never be chosen within the claimed range cannot be followed. If the preparation of the substantially linear LLDPE copolymers disclosed in the examples of D5 is a solution polymerisation, D5 also discloses in the passage bridging columns 11 and 12 that slurry or gas phase polymerisation can be used provided the proper catalysts and polymerisation conditions are employed.

Also, even if gas phase polymerisation was chosen for the preparation of the copolymer components (a) in the examples of the patent in suit (paragraph 105), it also indicates in paragraph 73 that polymerisation can equally be performed in a slurry. Since both D5 and the patent in suit suggest that the copolymer component (a) can be either produced according to a slurry or gas phase polymerisation, there is no evidence that the choice of a preparation in a slurry would not result in a melt elastic modulus G' within the claimed range.

1.9 Starting from the closest prior art D5, the choice of a substantially linear copolymer of ethylene corresponding to component (a) of claim 1 of the main request having a melt elastic modulus G' (G''=500 Pa) within the range of 10 to 150 Pa in view of providing alternative blends of copolymers of ethylene and alpha olefins and LDPE was obvious.

1.10 Accordingly, the subject-matter of claim 1 lacks an inventive step, contrary to the requirements of Article 56 EPC. The main request is therefore not allowable.

First and second auxiliary requests

2. Modifications

2.1 Claim 1 of the first auxiliary request differs from claim 1 of the main request (which corresponds to claim 1 of the application as originally filed) in that the range of values of the melt index for the component (a) was restricted from 5 to 50 to 12 to 50. The modification of claim 1 of the first auxiliary request finds a basis in claim 3 of the application as filed.

2.2 Claim 1 of the second auxiliary request differs from claim 1 of the main request in that the range of values of the melt index for the component (a) was restricted from 5 to 50 to 12 to 50 and its molecular weight distribution Mw/Mn is limited to the range of 2 to 3.5. These modifications are based on claims 3 and 6 as filed.

2.3 Although these two requests have been only filed by the respondent on 27 February 2015, after the reply to the statement of grounds of appeal, they can be seen as having been filed in reply to the introduction of the new evidence D18 to D21 by the appellant on 15 October 2014. The first and second auxiliary requests are therefore admitted into the proceedings (Article 13(1) RPBA).

3. Inventive step

3.1 The melt index of the component (a) is disclosed in paragraph 12 of the patent in suit. There is however no indication of its critical nature for the claimed subject matter. Among the examples provided in the patent in suit, examples 11 and 19 correspond to a component (a) having a melt index (10.8 and 11.53 g/10 min) outside the newly restricted range. Blends containing component (a) of examples 11 and 19 are disclosed in Table 3 (page 14, lines 44, 56 and 57 as well as page 15 line 8). None of these blends is however shown to display improved properties compared to the blends of the closest prior art D5. The technical problem solved by these blends is therefore, as for the main request, the provision of alternative blends of copolymers of ethylene and alpha olefins and LDPE. The closest prior art already disclosed in column 7, lines 49 to 54, that the melt index of the

substantially linear ethylene copo- or homopolymers may vary between about 0.01 and 40 g/10 min, greatly overlapping the range of 12 to 50 g/10 min now claimed in the first auxiliary request. Since it was not shown nor argued that the range of 12 to 50 g/10 min in the first auxiliary request lead to blends of improved properties and since that range was already largely disclosed in the closest prior art, the limitation introduced in the auxiliary request is seen as an arbitrary modification within the routine activity of the skilled person faced with the objective problem of providing alternative blends of copolymers of ethylene and alpha olefins and LDPE and thus does not involve an inventive step.

3.2 The second auxiliary request further adds to the subject matter of claim 1 a limitation of the molecular weight distribution Mw/Mn to the range of 2 to 3.5. The molecular weight distribution of the component (a) is disclosed in paragraph 13 of the patent in suit. There is no indication that that parameter is critical to the properties of the claimed blends. Among the examples provided in Table 1, example 19 corresponds to a component (a) having a molecular weight distribution (3.6) outside the claimed range. As no evidence of an improved property resulting from the selection of the molecular weight distribution within the range 2 to 3.5 was provided, the technical problem solved by the claimed subject matter of the second auxiliary request is also the provision of alternative blends of copolymers of ethylene and alpha olefins and LDPE. The closest prior art already disclosed in column 11, lines 18 to 22, that the molecular weight distribution Mw/Mn of the substantially linear ethylene copo- or homopolymers may vary between about 1.5 to about 8, encompassing the range of 2 to 3.5 now claimed in the

second auxiliary request. Since it was not shown nor argued that the range of 2 to 3.5 in the second auxiliary request lead to blends of improved properties and since that range was already largely disclosed in the closest prior art, the limitation performed in the auxiliary request is also considered as an arbitrary and obvious modification in view of D5. Therefore, the Board concludes that claim 1 of the second auxiliary request does not fulfil the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

B. ter Heijden F. Rousseau

Decision electronically authenticated