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**Datasheet for the decision  
of 22 March 2018**

**Case Number:** T 2215/14 - 3.3.03

**Application Number:** 02792963.7

**Publication Number:** 1456294

**IPC:** C08L23/10, C08F297/08

**Language of the proceedings:** EN

**Title of invention:**

IMPACT-RESISTANT POLYOLEFIN COMPOSITIONS

**Patent Proprietor:**

Basell Poliolefine Italia S.r.l.

**Opponent:**

Borealis AG

**Relevant legal provisions:**

EPC Art. 100(c), 100(b), 54, 56

**Keyword:**

Grounds for opposition - added subject-matter (no) -  
insufficiency of disclosure (no)

Novelty - (yes)

Inventive step - (yes)

**Decisions cited:**

G 0003/14, R 0009/14, T 0698/10, G 0002/98



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Case Number: T 2215/14 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 22 March 2018**

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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 11 September  
2014 revoking European patent No. 1456294  
pursuant to Article 101(3)(b) EPC.**

**Composition of the Board:**

**Chairman** D. Marquis  
**Members:** F. Rousseau  
C. Brandt

## Summary of Facts and Submissions

I. The appeal lies against the decision of the opposition division posted on 11 September 2014 revoking European patent No. 1 456 294. The contested decision was based on the patent as granted (main request), as well as an auxiliary request submitted during the oral proceedings on 10 July 2014.

II. Claims 1, 5 and 8 of the patent as granted, i.e. according to the text of the "Druckexemplar" enclosed in the communication under Rule 71(3) EPC of 17 December 2010, read as follows (a feature of claim 1 was misplaced in its version as published):

"1. Polyolefin compositions comprising (percent by weight):

1) 55%-90% of a crystalline propylene homopolymer or copolymer containing up to 15% of ethylene and/or C<sub>4</sub>-C<sub>10</sub>  $\alpha$ -olefin(s);

2) 10%-45% of a blend of a copolymer of propylene with more than 15% up to 40% of ethylene (copolymer (a)), and a copolymer of ethylene with one or more C<sub>4</sub>-C<sub>10</sub>  $\alpha$ -olefin(s) containing from 10% to 40% of said C<sub>4</sub>-C<sub>10</sub>  $\alpha$ -olefin(s) (copolymer (b)), wherein the weight ratio (a)/(b) is from 1/4 to 4/1, wherein the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature is from 0.8 to 1.5 dl/g.

5. A process for producing the polyolefin compositions of claim 1, carried out in at least three sequential steps, wherein in at least one polymerization step the relevant monomer(s) are polymerized to form component 1) and in the other two steps the relevant monomers are

polymerized to form copolymers (a) and (b), operating in each step, except the first step, in the presence of the polymer formed and the catalyst used in the preceding step.

8. Injection moulded articles comprising the polyolefin compositions of claim 1."

Claims 2 to 4 and 6 to 7 are dependent on claims 1 and 5, respectively.

III. The claims according to the first auxiliary request differed from those of the main request in that the C<sub>4</sub>-C<sub>10</sub> α-olefin used for copolymer (b) was defined to be 1-butene.

IV. The decision was taken having regard to the following documentary evidence amongst others:

D3: Datasheet Daplen® KB4436

D7: Internal product specification KB4436-0518 Boeralis GmbH

D9: AT 408 885 B

D10a-D10c: Internal product specification sheets for EE010AE

D14: External raw material specification ENGAGE 8400

D17: EP 0 856 555 A1

D18: WO 01/19915 A1

D21: Calculation of C<sub>2</sub> and C<sub>4</sub> contents based on the data given in Examples 5-13 of the patent in suit

D22: 1-octene content quantification by IR spectroscopy

D28: ASTM D5576

V. The opposition division held that the subject-matter of claims 2 to 8 of the patent as granted did not extend beyond the content of the application as filed. As

regards sufficiency of disclosure, even if the opponent was correct based on D21 that the examples of the specification could not be used to determine a measurement method of the various amounts of comonomers, even for butene, the skilled person could measure their various contents by IR, as shown in D28 for copolymers of butene and ethylene. For other comonomers the measure was also possible after the preparation of appropriate standards. Therefore, sufficiency of disclosure was acknowledged. Claims 1 and 2 of the main request however were found to lack novelty over the alleged public prior use of the product Daplen® KB4436, as shown among others by D3, D7, D9 and D10a to D10c. The subject-matter claimed in accordance with the auxiliary request was found to lack an inventive step starting from the teaching of D17, in particular its example 2, representing the closest prior art, since it would have been obvious for the skilled person in view of D18 to decrease the intrinsic viscosity of the soluble fraction of the rubber component in order to improve the haze of the polyolefin composition.

- VI. An appeal against that decision was lodged by the patent proprietor (appellant). The statement setting out the grounds of appeal included three sets of claims as first to third auxiliary requests which were filed again with letter dated 21 February 2018.
- VII. The opponent (respondent) submitted with the rejoinder (letter of 3 June 2015) further documentary evidence, including the following documents relating to the alleged public prior use of Daplen® KB4436:

D6a: Invoice for Daplen® KB4436

D29: 1-octene content quantification by IR spectroscopy of an ethylene-co-octene/propylene blend

D31: Affidavit of Mr Berger concerning the split in D10a to D10c.

VIII. A communication of the Board of 9 February 2018 sent in preparation of oral proceedings was issued.

IX. The respondent made further submissions with letters of 21 February 2018 and 7 March 2018. The following documents were submitted with the letter of 21 February:

D33: Excerpt of Polypropylene, The Definitive User's Guide and Databook, C. Maier and T. Calafut, Plastics Design Library, 1998, pages 15, 23, 24 and 131

D34: EP 0 395 083 A2.

X. Additional submissions by the appellant were made with letter of 21 February 2018, which letter included a retyped version of the claims as granted and a copy of the first to third auxiliary requests submitted with the statement of grounds of appeal.

XI. Oral proceedings before the Board took place on 22 March 2018.

XII. As far as relevant to the present decision, the submissions of the appellant can be summarized as follows:

*Article 100 c) EPC*

(a) The intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature from 0.8 to 1.5 dl/g introduced into

claim 1 during examination proceedings was one of the preferred features of the composition which was not linked to any specific embodiment, as shown by original claim 3. Moreover, the content of polymer insoluble in xylene related to the isotacticity of component (1) and the intrinsic viscosity of the overall xylene soluble portion related to the molecular weight of a portion of the total composition. Accordingly, these two preferred features indicated on page 2 of the application as filed were not linked to each other. Transparency was a desired effect indicating the usefulness of the composition. The omission of this effect in claim 1 did not add technical information. Thus, the introduction of this feature alone into claim 1 did not extend beyond the scope of the application as filed.

*Article 100 b) EPC*

- (b) The respondent had not shown that the preparation of a copolymer of ethylene and octene was impossible, since the copolymer needed not be prepared in the last step of the sequential polymerisation. The other objections related to the clarity of the definition of the amount of comonomers present in copolymers (a) and (b), but not to sufficiency of disclosure of the invention. There was also no requirement that the content of octene should be determined on the copolymer, since the content of octene could be calculated on the basis of its consumption during the polymerisation.



*Article 100 a) EPC - Novelty*

- (c) The respondent had not proven that Daplen® KB4436 had been made available to the public before the priority date of the patent in suit and that it contained copolymer (a) of the opposed patent. Accordingly, even if one took the view of the opposition division that the given ranges for component 1) and component 2) defined in claim 1 as granted were based on the total amount of those components 1) and 2), the public prior use alleged by the respondent had not been proven.

*Article 100 a) EPC - Inventive step*

- (d) The closest prior art was represented by D18 which related like the patent in suit to the technical problem of providing polyolefin compositions with improved balance of processability, mechanical and optical properties. The compositions according to claim 1 as granted differed from those disclosed in D18 in that they contained the ethylene propylene copolymer (a) which was not mentioned in said document. The presence of that component in combination with an intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature as defined in claim 1 allowed to obtain, differently from D18, the simultaneous advantage of ductile/brittle transition temperature lower than  $-25^{\circ}\text{C}$  and low haze/improved transparency. The addition of said ethylene propylene copolymer (a) in order to obtain those advantages was suggested neither by D18 which did not suggest the presence of an additional component, nor by D17 which did not address even implicitly articles having appropriate optical

properties. Comparing the Izod impact strength values at  $-30^{\circ}\text{C}$  of the compositions of Examples 1 and 2 of D17 or of the compositions of Example 3 and Comparative Example 3, the skilled person was given the information that better impact properties would be achieved by increasing the molecular weight of the amorphous part of the composition, i.e. increasing the intrinsic viscosity of the fraction soluble in xylene, so that D17 did not suggest the claimed compositions. An inventive step was therefore to be acknowledged.

XIII. As far as relevant to the present decision, the submissions of the respondent can be summarized as follows:

*Article 100 c) EPC*

- (a) The sole basis in the application as filed for the feature defining that the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature was from 0.8 to 1.5 dl/g was on page 2, line 16. This feature, however, was only disclosed in the context of a specific isotacticity of the propylene homopolymer or of the copolymer, with the additional requirement that the final composition was highly transparent, although the compositions defined in the application as filed also covered non-transparent embodiments when additional components such as colorants or fillers were used. In addition, other factors such as the viscosity ratio between the matrix and the rubber, which had an influence on the particle size of the dispersed phase, were decisive to achieved good optical properties. Accordingly, claim 1 which did not contained all these features necessary to

obtain high transparency contained added subject-matter. The same applied to the dependent claims, which were originally only dependent on claim 1, but not linked to said passage of the description defining the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature. In addition, original process claim 5 defined only the preparation of the composition according to claim 1, but not that of the composition according to claim 1 as granted, as shown by examples 1 to 4 of the original disclosure, which were in accordance with original process claims 5 to 7, but did not provide a composition in accordance with claim 1 as granted. Thus, also claims 5 to 7 contained added subject-matter.

*Article 100 b) EPC*

- (b) The essential aspect of the opposed patent was to prepare a heterophasic system by sequential polymerisation, since the desired low haze value of the claimed compositions could only be achieved, if at all, by said preparation method as could be concluded on the basis of D33. For such a complex system, the skilled person was not able to accurately determine the amount of the different comonomers in each of the various type of copolymers for which at least 3 different  $\alpha$ -olefins had been used. The patent in suit gave only information for 1-butene which was determined by IR, but no information how to measure the content of 1-hexene or 1-octene. As confirmed by D29 and D22, the method described in D28 was not suitable to determine the amount of comonomers in terpolymers, in particular in relation to 1-octene.

There was also no guidance as to how a claimed composition could be obtained for a copolymer of ethylene with 1-octene, since document D34 cited in the opposed patent for the description of sequential polymerisation only referred to the polymerisation of ethylene and 1-butene. Accordingly, the skilled person was not in a position to perform the invention over the whole range claimed.

*Article 100 a) EPC - Novelty*

- (c) It could be understood that the amounts of component 1) and component 2) defined in claim 1 of the opposed patent related to the total composition, which could, as shown in paragraph [0045] of the specification, also contain additional components. However, taking the view of the opposition division that the given ranges for component 1) and component 2) were based on the total amount of those components 1) and 2), it should be concluded that the sale of Daplen® KB4436 to the customer identified in D6a constituted a public disclosure of the subject-matter of claim 1 as granted.

*Article 100 a) EPC - Inventive step*

- (d) The effect of enhanced transparency indicated in the opposed patent could not be retained for selecting the closest prior art, since it was evident that this effect was not achieved over the whole area of operative claim 1. This position was supported by decision T 698/10 reference being made to point 3.4. of the reasons for the decision. It was not justified to decide upon the selection of

the closest prior art based on an effect mentioned in the patent, but that was not achieved over the whole area claimed, because such an approach would exclude relevant prior art bringing the patent proprietor in a non-justified advantageous position when discussing inventive step. Accordingly, the closest prior art was not D18, but D17 or D9, which came structurally much closer to the claimed subject matter than what was described in D18.

- (e) If one nevertheless started from D18 as the closest prior art, the problem successfully solved vis-à-vis that prior art was merely the provision of further polyolefin compositions, since as demonstrated by a comparison of Example 8 of the patent in suit with Example 4 of D18 or of Example 13 of the patent in suit with Example 1 of D18, the addition of a propylene-ethylene rubber in accordance with the definition in operative claim 1 led to inferior properties. There was also no evidence that the addition of ethylene propylene rubber or the replacement in part of the ethylene-1-butene copolymer of D18 by an ethylene-propylene rubber led to any improvement, let alone without any decrease of other properties such as the optical properties.
  
- (f) A comparison of examples 3 and 4 of D17 showed that an increasing amount of rubber brought about an increase of the impact strength, which was correlated with a lower ductile/brittle transition temperature as for example indicated in the third and fourth paragraphs on page 4 of D18. It was also stated in D17 (page 4, lines 48 and 49 and the examples) that it was the specific selection of the ethylene-higher  $\alpha$ -olefin copolymers, like

ethylene-1-butene copolymer or ethylene-1-octene copolymer, which was essential for a low temperature impact. Thus it was obvious from D17 that a rubber phase containing a propylene-ethylene rubber as well as a propylene-1-butene copolymer in the amounts defined in claim 1 of the patent in suit led to good impact behaviour at low temperature and thus to a low ductile/brittle transition temperature. Accordingly, the skilled person starting from D18 and seeking to provide further polyolefin compositions without compromising the impact properties (as expressed by the ductile/brittle transition temperature) would have been prompted to use in the compositions of D18 a propylene-ethylene rubber as defined in claim 1 of the patent as granted. The compositions defined in claim 1 as granted therefore lacked an inventive step.

- XIV. The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, alternatively, that the patent be maintained in amended form on the basis of any of the first to third auxiliary requests filed with the statement of grounds of appeal and filed again with letter dated 21 February 2018.
- XV. The respondent requested that the appeal be dismissed. It was also requested that the first to third auxiliary requests be not admitted into the proceedings.

## Reasons for the Decision

### *Article 100(c) EPC*

1. In accordance with the established Case Law of the Boards of Appeal of the EPO, the relevant question to be decided in assessing whether the subject-matter of an amended claim extends beyond the content of the application as filed, is whether after the amendment the skilled person is presented with new technical information (see G 2/10, OJ 2012, 376, point 4.5.1 of the Reasons and Case Law of the Boards of Appeal, 8<sup>th</sup> Edition, 2016, II.E.1).
- 1.1 In line with dependent claim 3, the application as filed defines on page 2, lines 14-16 that a preferred feature for the compositions of the present invention is an intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature which is from 0.8 to 2.5 dl/g. According to page 2, line 16 said parametric value is within the range from 0.8 to 1.5 dl/g when high transparency is desired. According to the appellant the skilled person would understand that said parametric sub-range should be contemplated only when high transparency is to be achieved, which would mean that other features necessary to obtain high transparency should also be included in claim 1 in addition to that sub-range in order to avoid an extension of the subject-matter beyond the content of the application as filed. The Board, however, cannot recognise such disclosure in the application as filed. Claim 3 of the application as filed discloses that the whole range from 0.8 to 2.5 dl/g can be covered without any restriction to other conditions, let alone any separation between

embodiments providing high transparency and those which do not. The passage on page 2, lines 15 indicating "when high transparency is desired" is in the Board's opinion only to be understood as meaning that a composition meeting the parametric condition now inserted in claim 1 is more likely to provide high transparency, as it is evident for the skilled reader of the application as filed, in line with the appellant's position, that the achievement of high transparent products depends on many other features. On this basis, the definition of the range of 0.8 to 1.5 dl/g in operative claim 1 is considered to be directly and unambiguously disclosed in the application as filed, even in the absence of any other feature that might otherwise be necessary to obtain high transparency.

- 1.2 As noted by the respondent, the range of parametric values inserted in claim 1 as originally filed is disclosed in a passage of the original disclosure starting at page 2, line 8 defining various preferred features for the compositions of the present invention, which preferred features are therefore understood to correspond to preferred features of the composition according to claim 1 of the application as filed. Contrary to the opinion of the respondent, there is, however, no indication that the requirement for any range of intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature as defined on page 2, lines 14-16, from which the sub-range of intrinsic viscosity  $[\eta]$  introduced into claim 1 originates, should necessarily be read in combination with another preferred feature of the compositions of the invention, let alone the content of polymer insoluble in xylene at room temperature defined on page 2, lines 9 to 13. The mere



fact that these two features are listed side by side in the same paragraph as preferred features of the invention does not render their combination implicitly mandatory for the skilled reader. This is illustrated by the fact that dependent claim 3 as originally filed defines the same preferred feature of an intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature of from 0.8 to 2.5 dl/g as defined in the passage on page 2, lines 14-16 of the description without imposing any restriction on the content of polymer insoluble in xylene at room temperature. Furthermore, these features cannot be considered to be inextricably linked, since they relate to two different parts of the compositions, namely to component 1) for the content of polymer insoluble in xylene at room temperature and as shown by examples 5 to 13 of the application as filed to a great extent to the components resulting from the production of copolymers (a) and (b).

- 1.3 The unsubstantiated objection submitted in writing that any dependent claim of the main request extended beyond the content of the application as filed, because there was no basis for combining the sub-range of the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature contained in granted claim 1 with features from original dependent claims, which dependent claims were only linked to original claim 1, was not further specified, let alone reiterated at the oral proceedings. That objection in any event fails to convince, since exemplified compositions 5 to 13 provide a pointer to the combination of parameters now defined with dependent claims 2 to 5, i.e. all these compositions fulfill the additional conditions in respect of Melt Flow rate value, content of polymer

soluble in xylene at room temperature and ductile/  
brittle transition temperature set out in dependent  
claims 2 to 4 of the main request.

- 1.4 The additional objection submitted only in writing that process claims 5 to 7 extended beyond the content of the application as filed is based solely on the argument that the compositions described in examples 1 to 4 of the patent in suit, which are obtained with the measures defined in those process claims, do not fulfill the requirement that the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature is within the range now defined in claim 1 of the main request. This argument does not take into account the implicit disclosure in the application as filed that the process defined in claim 5 was applicable for preparing all compositions within the ambit of claim 1 as filed, in particular those fulfilling the additional requirement now inserted in claim 1 of the main request, as is confirmed by examples 5 to 13 of the application as filed. Thus, this additional objection also fails to convince.
- 1.5 Accordingly, the subject-matter as defined in the main request is considered to fulfill the requirements of Article 123(2) EPC.

*Sufficiency of disclosure*

2. In accordance with Rule 43(1) EPC - the invention in the European patent application is defined by the subject-matter of the claims, i.e. the specific combination of features present in the claims, as emphasised in Opinion G 2/98 of the Enlarged Board of Appeal (OJ 2001, 413, point 2 of the Reasons).

Accordingly, the question to be answered in respect of sufficiency of disclosure of the present invention is whether on the basis of the information provided in the patent specification and, if necessary, using common general knowledge the skilled person is able to prepare with reasonable effort polyolefin compositions according to the terms of claims 1 to 4, a process for their production according to claims 5 to 7 and injection moulded articles comprising the polyolefin of claim 1 as defined in claim 8.

- 2.1 The objection of the respondent concerns the ability of the skilled person to accurately determine the amount of different comonomers in a complex system such as that claimed in the patent in suit which contains at least 3 different  $\alpha$ -olefins. It is the respondent's point that, owing to the absence of an analytical method to determine the amount of those comonomers, the skilled person is not in a position to perform the invention.
- 2.2 Although the difficulty to exactly determine, starting from a given polyolefin composition, the content of ethylene and/or C<sub>4</sub>-C<sub>10</sub>  $\alpha$ -olefins in different compounds contained in a mixture of the type defined in present claim 1 might be an issue when assessing a possible infringement of the present patent, the relevant issue in these proceedings is however that of sufficiency of disclosure of the invention, which is defined by the terms of the present claims, which terms do not require the determination on the mixture defined in claim 1 of the amount of ethylene and/or C<sub>4</sub>-C<sub>10</sub>  $\alpha$ -olefins contained in the different compounds of said mixture. The argument that the skilled person, based on his general knowledge, is not in a position to determine accurately the amount of different comonomers in a

complex system as claimed boils down to the argument that the boundaries of the claims defining the polyolefin compositions are not clearly defined. That argument is rather a matter of clarity, as is illustrated by the fact that variations of the amount of comonomers used in each of the sequential polymerisation steps employed for the preparation of the claimed polyolefin composition (see also point 2.3 below) allow large variations of the comonomers contents in each of the components separately prepared. In other words the contents of the comonomers in the components sequentially prepared can be not only within, but also outside of the ranges defined in claim 1 as granted, meaning that all polyolefin compositions around the limits defined by the subject-matter of claim 1 can in fact be obtained. In view of the ruling of G 3/14 (OJ 2015, A102) this alleged lack of clarity already present in claim 1 as granted, however, cannot be objected under Article 84 EPC.

- 2.3 The patent in suit provides in paragraphs [0017] to [0042] and [0047] to [0052] general information on the measures to be taken in order to prepare the claimed compositions, a more precise teaching being indicated in Tables 1 to 4 which concern the preparation of polyolefin compositions comprising ethylene-propylene and ethylene-butylene copolymers. The Board has no doubt that the skilled person would be able on the basis of the above teaching, the common general knowledge in the art and a reasonable amount of routine experimentation, in particular by selecting the appropriate polymerisation process (gaseous and/or liquid polymerisation) depending on the monomers to be copolymerized and varying the proportions of said comonomers in each of the reactors, to prepare over the whole scope of claim 1 compositions containing a

crystalline propylene homopolymer or copolymer containing up to 15% of ethylene and/or C<sub>4</sub>-C<sub>10</sub> α-olefin(s) (component 1), as well as a copolymer of propylene with more than 15% and up to 40% of ethylene (copolymer (a)) and a copolymer of ethylene with one or more C<sub>4</sub>-C<sub>10</sub> α-olefin(s) containing from 10% to 40% of said C<sub>4</sub>-C<sub>10</sub> α-olefin(s) (copolymer (b)). The measurements of the content of xylene soluble and of the Melt Flow Rate indicated in Tables 1 to 4 of the specification to have been made for each of the sequential polymerisation steps also demonstrate that there is no need to analyse all the various components of the obtained mixture after the final polymerisation step.

2.4 The respondent's objection that copolymers of ethylene with 1-octene could not be prepared in a gas phase reaction, in particular as the relevant comonomers had different boiling points, does not lead to the conclusion that a lack of sufficiency of disclosure arises, since the terms of the claims do not require the use of a gas phase reaction when preparing copolymers comprising octene. As indicated in paragraph [0021], the polymerisation can be carried out following known techniques, operating in liquid phase, in the presence or not of inert diluent, or in gas phase, or by mixed liquid-gas techniques. Having regard to the known high boiling point of octene, it is rather a matter of routine for the skilled person not to use a gas phase polymerisation to prepare a copolymer of ethylene with that comonomer.

2.5 D21 was submitted by the respondent in order to show that the examples of the patent in suit are of no assistance to the skilled person seeking to reproduce the present invention, based on the argument that for

the processes exemplified in the patent in suit the amounts of ethylene indicated to be contained in the various components obtained after each of the sequential steps do not fit with the total amount of ethylene indicated to be contained in the final product. The respondent indicated at the oral proceedings that the calculations provided in D21 were based assuming a split value of 100 wt% for the polymer produced in the first and second liquid phase reactors, which assumption is questionable, since the split values corresponding to the products produced in the two gas phase reactors are defined in the notes to the table on page 10 of the specification as to be the weight fraction of polymer produced in the specified reactor. Accordingly, the assumption should rather be that the split corresponding to the first and second liquid phase reactors should be 100% minus the splits indicated for each of the reactions carried out in a gas phase reactor. Based on that last assumption, however, the amounts of ethylene indicated to be contained in the various components obtained in each of the sequential steps is in agreement with the total amount of ethylene indicated to be contained in the final product. Accordingly, the calculation provided by the respondent with D21 does not raise any doubt as to the existence of a sufficient teaching in the patent in suit for producing the claimed polyolefins.

2.6 Furthermore, the expert of the respondent acknowledged during the oral proceedings that the skilled person based on the consumption of the various monomers in each of the sequential steps and the split used between the various components produced during the sequential polymerisation would be able to calculate the content of the various monomers comprised in each of the components produced during the sequential

polymerisation. The Board concludes therefrom that the skilled person would be able to reasonably estimate the amount of the various comonomers contained in each of components sequentially prepared.

- 2.7 Therefore, in view of the above, there is no reason in the light of the submissions made by the respondent to conclude that the subject-matter of the granted claims lacks sufficiency of disclosure.

### *Novelty*

3. The objection of lack of novelty is based on the alleged public prior use of the product Daplen® KB4436. In accordance with settled case law it has to be established (i) when that prior use occurred, (ii) what was made available to the public through that use and (iii) the circumstances of the use.

- 3.1 Daplen® KB4436 is an elastomer modified polypropylene compound comprising 55.6% by weight of a product named EE010AE, 30% by weight of a mineral compound named Woll 2.2 (Nyglos 8) and 9.5% by weight of a product named Engage 8400 (see D3 and D7). According to D9 and D14, Engage 8400 is a copolymer of ethylene and octene which comprises 24% by weight of octene, i.e. a copolymer (b) within the meaning of the patent in suit. It is also not disputed that EE010AE is an elastomer modified propylene copolymer constituted by a propylene homopolymer fraction and a propylene ethylene copolymer fraction prepared in 2 loop reactors and a gas phase reactor, as shown by documents D10a to D10c.

It is the respondent's opinion based on D31 that the wordings "Split loop1/loop2 55/45" and "Split GPR 40" in D10a to D10c indicate that for 100 parts of

propylene homopolymer prepared in the loop reactors, 40 parts of the propylene ethylene copolymer are prepared in the subsequent gas phase reactor. The respondent therefore concludes that the amount of the propylene ethylene copolymer rubber contained in EE010AE is  $40/140 = 28.6\%$  by weight, meaning that EE010AE comprises at most  $100/140 = 71,4\%$  of propylene homopolymer. From the respondent's submissions, it results therefore that Daplen® KB4436 which comprises 55,6% by weight of EE010AE comprises at most  $55,6\% \times 71,4\% = 39,7\%$  by weight of propylene homopolymer, i.e. an amount which is below the minimum amount of 55% by weight required by claim 1 of the patent in suit.

- 3.2 As acknowledged by the respondent, the objection that the alleged prior public use of Daplen® KB4436 was novelty destroying is based on a reading of claim 1 according to which the weight percentages defined for components 1) and 2) were based on the sum of the amounts of those components, which appears to have been the line taken by the opposition division in the contested decision (see point 8.1.1 of the reasons) in which it was considered that Daplen® KB4436 was a blend of 85 wt% EE010AE and 15 wt% Engage 8400, ignoring the presence of 30 % by weight of filler. However, according to a normal reading of the expression "compositions comprising (percent by weight)" at the beginning of claim 1, which is followed by numerical ranges in % defined for components 1) and 2), the implicit assumption underlying the meaning of that claim is in the absence of any indication to the contrary in the whole specification that the amounts defined in claim 1 for components 1) and 2) are based on the whole composition. The mere fact that the amounts of components 1) and 2) might add up to 100% is not sufficient to interpret claim 1 as defining that



those amounts are based on the sum of components 1) and 2).

- 3.3 Accordingly, the public prior use invoked by the respondent which is based on the alleged sale of Daplen® KB4436 to the customer identified in D6a relates to a composition which differs from those defined in operative claim 1 as is shown in above section 3.1. Novelty of the claimed subject-matter is therefore to be acknowledged for lack of identity between the claimed subject-matter and the alleged public prior use.

*Inventive step*

4. As reminded by the Enlarged Board of Appeal in case R 0009/14 (see point 2.1.1 of the reasons reasons), it is established board of appeal case law that inventive step is to be examined using the problem-solution approach, which includes as the first step to determine the closest prior art and then to assess the technical problem which can be considered to be effectively solved vis-à-vis that closest prior art. In that respect, the problem indicated in the patent in suit might need to be reformulated if the latter cannot be considered to have been solved, because for example the closest prior art was not the starting point for the invention indicated in the patent in suit or the evidence or arguments submitted to show that the problem was solved were not found to be convincing.

*Closest prior art*

5. The closest prior art for the purpose of assessing inventive step is normally a prior art document disclosing subject-matter conceived for the same

purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural and functional modifications (Case Law, supra, I.D.3.1).

- 5.1 As shown in paragraphs [0002] to [0004] and [0010] of the patent in suit, the purpose of the present invention was to provide compositions which are easily processed by injection-moulding and exhibit an improved balance of properties having regard to impact resistance and transparency, in particular an improved balance of properties compared to the compositions described in WO 01/19915 (i.e. D18 in the present appeal proceedings). The compositions of the patent in suit are to be used for housewares and toys, in particular for food-contact applications.
- 5.2 Neither D17, nor D9, both proposed by the respondent as closest prior art, relate to the preparation of transparent articles. This is apparent for example from the type of articles mentioned in D17 (page 2, lines 14-18 and page 6, lines 24-26) and those mentioned in D9 (page 4, line 4), i.e. automotive parts such as bumpers, instrument panels, fan shrouds, glove boxes and garnishes, and parts of household appliances such as television sets, video tape recorders, washing machines and vacuum sweepers, as well as the presence in the compositions of D9 of a large amount of mineral fillers (claim 1). Accordingly, neither D17 nor D9 can be considered to represent a realistic or suitable starting point for the skilled person wishing to solve the problem mentioned in the patent in suit. In other words starting from D17 or D9 as the closest prior art, because the compositions described therein are structurally close to those claimed in the patent in

suit can only be the result of an inadmissible hindsight knowledge of the present invention. It thus follows that the reasons invoked by the opposition division and the submissions of the respondent in their rejoinder as to why claim 1 would lack an inventive, which are based on the disclosure of D17 as the starting point for the claimed invention are inevitably tainted with hindsight bias and therefore cannot convince the board.

- 5.3 By contrast, D18 relates to polyolefin compositions similar to those of the claimed invention and for which similar properties are required, including transparency (see page 1, lines 8-10 and page 2, lines 7-11).

The polyolefin compositions described in D18 comprise according to its claim 1 in percent by weight A) 60%-95% of a crystalline polypropylene component comprising two fractions of different Melt Flow Rate independently selected from propylene homopolymers and random copolymers of propylene containing up to 15% of ethylene and/or C<sub>4</sub>-C<sub>10</sub> α-olefin(s) and B) 5%-40% of a copolymer of ethylene with one or more C<sub>4</sub>-C<sub>10</sub> α-olefin(s) containing from 10 to 40% of said C<sub>4</sub>-C<sub>10</sub> α-olefin(s). According to the passage bridging pages 2 and 3, which is illustrated by Examples 1, 2 and 4 (Table 1 on page 16 and Table 2 on page 17), the intrinsic Viscosity [η] of the fraction of the overall composition soluble in xylene at room temperature should be from 0.8 to 2, most preferably 0.8 to 1.9, in particular 0.8 to 1.5 dl/g, when high transparency is desired. The amount of the fraction soluble in xylene correlates with the amount of the amorphous content of the composition, its intrinsic viscosity being indicative of the molecular weight of the amorphous part of the composition.

5.4 The respondent argued citing decision T 698/10 that the effect of enhanced transparency indicated in the opposed patent could not be retained for selecting the closest prior art, since it was evident that this effect was not achieved over the whole area of operative claim 1. The Board does not agree with the respondent's view, since inherently any assessment of the "objective technical problem", i.e. the problem which can be considered to be successfully solved vis-à-vis the closest prior art, can only take place once the closest prior art has been determined, in accordance with the first step of the problem solution approach. Point 3.4 of the reasons for decision T 698/10 which was referred by the respondent quoting *"the closest prior art need not disclose all the problems solved by the claimed invention, in particular it need not disclose the objective technical problem, which is only determined in the second step of the problem and solution approach based on the technical effect(s) provided by those features distinguishing the invention as claimed from the closest prior art"* confirms this.

5.5 As noticed by the respondent the choice of the closest prior art might be influenced by the indication of a problem mentioned in the patent in suit, which problem, however, in the second step of the problem solution approach might not be found to be successfully solved for the reasons indicated in above section 4. The respondent argued that it was not justified to decide the selection of the closest prior art based on an effect that is not achieved over the whole area claimed, because such an approach would rule out relevant prior art simply by discussing in a patent desired improvements that are not achieved by the claimed subject matter over the whole area claimed,

bringing the patent proprietor in a non-justified advantageous position when discussing inventive step. The Board disagrees, since any assessment of inventive step also includes an analysis of the obviousness of the measures to be taken in order to solve the objective problem when starting from the closest prior art. In other words, whereas the absence of indication of a technical effect in a prior art document might lead the skilled person to disregard that document as a suitable starting point for the invention, said document in the situation addressed by the respondent, i.e. when said effect is in fact not achieved over the closest prior art, cannot be disregarded when assessing obviousness of the solution on the basis that this effect is not mentioned there, since in such situation the alleged effect is not retained for the formulation of the problem.

5.6 Consequently, in accordance with the acknowledgement of D18 as prior art in paragraph [0004] of the patent in suit, the embodiments of D18 relating to embodiments exhibiting low haze values, i.e. those required to have an intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature in the range of 0.8 to 1.5 dl/g represent a realistic starting point for the invention as claimed and are taken as the closest prior art.

5.7 As follows from above section 5.3, the polyolefin compositions in accordance with claim 1 as granted differ from those of the closest prior art in that they contain, in addition to or in replacement of part of the copolymer of ethylene with one or more  $C_4-C_{10}$   $\alpha$ -olefin(s) contained in the optical transparent compositions of D18 a copolymer of propylene with more than 15% and up to 40% of ethylene. The intrinsic

viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature is still in the range from 0.8 to 1.5 dl/g, which means that the range of viscosity defined in operative claim 1 also relates to the amorphous part of the composition originating from said additional copolymer of propylene with ethylene.

*Problem successfully solved*

6. Having regard to the disclosure of D18 the appellant argued that the problem solved by the subject-matter of claim 1 was the provision of polyolefins compositions exhibiting simultaneously a ductile/brittle transition temperature lower than  $-25^{\circ}\text{C}$  and low haze, whereas the respondent saw the problem solved over D18 in the mere provision of further polyolefin compositions.

6.1 Before addressing the influence of the copolymer of propylene with more than 15% and up to 40% of ethylene as defined in operative claim 1 on the properties of the optical transparent polyolefin compositions described in D18, it is first noted that D18 indicates the existence of a correlation between the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature and the optical transparency (indicated by its Haze values) of the polyolefins described in that document, the intrinsic viscosity being more preferably in the range of 0.8 to 1.5 dl/g when high transparency is desired, optical transparency improving with decreasing intrinsic viscosity (see above section 5.3 and D18, page 3, lines 25-31). This observed empirical relationship was not disputed by the respondent. The same empirical relationship according to which optical transparency improves with decreasing intrinsic

viscosity of the fraction of the overall composition soluble in xylene at room temperature is also observed over a broad range of intrinsic viscosity values in the context of the polyolefin compositions described in the disputed patent (see in particular compositions labelled Ex.1 to Ex. 8 tested with the same plaque thickness), although in a slightly different context than in D18, since the fraction of the overall composition soluble in xylene at room temperature also contains the amorphous part of the composition originating from said additional copolymer of propylene with ethylene.

6.2 As to the impact resistance at low temperatures, D18 indicates on page 3, line 28 that the ductile/brittle transition temperature is lower the greater the intrinsic viscosity of the fraction soluble in xylene at room temperature. Accordingly, D18 describes on page 4, lines 7-11, that in addition to the preferred range of intrinsic viscosity of the fraction soluble in xylene at room temperature, applicable when excellent optical properties are desired, another preferred range of said intrinsic viscosity exists, namely from more than 1.5 to 2.5 dl/g, applicable when low ductile/brittle transition temperatures, and consequently improved impact resistance at low temperatures, are desired. D18 also specifies in the same passage that in this latter range of intrinsic viscosity the Haze values are generally in the range from 45 to 75%.

6.3 Accordingly, having regard to the compositions exhibiting high transparency which are disclosed in D18, serving as starting point for the present invention, there is no reason to expect in view of the above mentioned empirical relationship that the modification operated by the present inventors, which

consists in the additional presence of a copolymer of propylene with more than 15% up to 40% of ethylene while keeping the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature from 0.8 to 1.5 dl/g would lead to a substantial decrease of the optical transparency of the polyolefin composition. It is also undisputed by the respondent that the presence of said copolymer of propylene with more than 15% up to 40% of ethylene lower the ductile/brittle transition temperature of the composition thereby improving its impact strength at low temperature of the transparent polyolefin compositions of D18.

- 6.4 The respondent argued that compositions of Examples 13 and 8 of the patent in suit would provide in comparison to compositions of Examples 1 and 4 of D18, respectively, higher haze values, which was seen as an indication that the compositions in accordance with claim 1 as granted would exhibit lower optical transparency. This argument based solely on the above two comparisons without an analysis of the various features of the compositions compared in order to analyse the influence of the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature on the optical transparency cannot convince the Board that the empirical demonstration provided in the patent in suit, which is based on numerous exemplified compositions, is in fact not valid. The argument by the respondent that the composition in accordance with claim 1 covers non-transparent embodiments when they contain additional components such as colorants or fillers implies the idea that the optical transparency of the objects defined by the subject-matter of claim 1 should be compared in absolute value to that obtainable in D18



when defining the problem solved vis-à-vis the closest prior art. The Board notes in this respect that D18 also describes the use of such additives (see page 8, lines 7-9). The present issue is not whether all compositions covered by the subject-matter of claim 1, in particular those containing some filler or colorant, present in absolute value an optical transparency which is as good as that of some specific embodiments disclosed in D18. It is rather whether all other things being equal the presence of a copolymer of propylene with more than 15% and up to 40% of ethylene, the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature being still in the range from 0.8 to 1.5 dl/g, leads to compositions exhibiting simultaneously a ductile/brittle transition temperature lower than  $-25^{\circ}\text{C}$  without substantially lowering the optical transparency. Hence, the above arguments of the respondent that the claimed polyolefin compositions can exhibit worse optical transparency values than some specific compositions of the closest prior art is not relevant to the question as to whether the problem formulated by the appellant is successfully solved.

- 6.5 On that basis the Board is satisfied that the problem effectively solved by the subject-matter of granted claim 1 over the embodiments of D18 exhibiting low haze values is to provide polyolefins compositions having improved impact strength at low temperature while substantially retaining the optical transparency.

*Obviousness*

7. The question remains to be answered if the skilled person desiring to solve the problem identified above, would, in view of the prior art, have modified the

disclosure of the closest prior art in such a way as to arrive at the subject matter of operative claim 1. In particular, it has to be assessed if there was any hint in the prior art cited to solve the above problem by the use a copolymer of propylene with more than 15% and up to 40% of ethylene, the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature being still in the range from 0.8 to 1.5 dl/g.

- 7.1 The respondent referred in this respect to D17. It was argued that this document teaches the use of a propylene-ethylene rubber also prepared in the course of a sequential polymerisation in order to improve the low-temperature impact strength of a propylene composition already comprising an ethylene- $\alpha$ -C<sub>3</sub>-C<sub>16</sub> olefin copolymer rubber. However, as illustrated by (comparative) examples 1 to 4 of the patent in suit, the incorporation of such a copolymer prepared in the course of a sequential polymerisation does not necessarily lead to an intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature which is the range from 0.8 to 1.5 dl/g, but may also lead to values of that parameter which are much higher, from which a substantial decrease of the optical transparency would result. However, in order to arrive at the subject-matter of granted claim 1 the skilled person should be prompted to obtain a composition for which the intrinsic viscosity  $[\eta]$  of the fraction of the overall composition soluble in xylene at room temperature is from 0.8 to 1.5 dl/g in order to substantially maintain the optical transparency. There is, however, no reason to assume for the skilled person that this range also used in the context of the D18 should be maintained in a different context, i.e. when a further amorphous

component is produced in addition to that resulting from the preparation in D18 of the copolymer of ethylene with one or more C<sub>4</sub>-C<sub>10</sub> α-olefin(s). There is also no explanation in D18 linking the selection of this range of parametric values to the structural features of the compositions of D18 and the optical transparency of the parts produced therewith, so that the skilled person has no reason to extrapolate the teaching of D18 to a different context, in particular in a context in which an additional rubber component which is expected to change the nature of the component soluble in xylene at room temperature is used. Accordingly, D17 cannot provide any solution to the problem effectively solved by the subject-matter of granted claim 1.

- 7.2 Consequently, the objection by the respondent that the subject-matter of granted claim 1 would lack an inventive step starting from D18 fails to convince.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is maintained unamended.

The Registrar:

The Chairman:



I. Aperribay

D. Marquis

Decision electronically authenticated